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14. ABSTRACT
A descriptive case study examining the most efficient and effective way to deliver ambulance services to Fort Eustis, VA. The cost of maintaining the current process is cost prohibitive. The alternatives examined maintaining a hospital based service, moving assets to the installation fire department, maximizing the mutual aid agreements with local civilian EMS services, or contracting with a private ambulance company. The study included an examination of the external and internal environment. A decision matrix with variables representing access quality, and cost indicated the most efficient was a hospital-based system. However, the study revealed that a combination of strategies would further increase efficiency.

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Optimization of Ambulance Services at McDonald Army Community Hospital

MAJ Philip Sheridan

Paper submitted in partial fulfillment for the requirements of Residency Completion

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Disclaimer as Called for by Army Regulation 360-5

The opinions or assertions contained herein are the private views of the author and are not to be considered as official policy or position, or as reflecting the views of the Department of the Army, the Department of Defense or the United States Government.

Ethical Considerations

The data used in the study will be anonymous and will not be patient specific. Patient confidentiality will be maintained and the provisions of the Health Insurance Portability and Accountability Act (HIPAA) will be maintained. Each Emergency Medical Services expert will be informed of the Graduate Management Project's management question.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Optimization of ambulance services at McDonald Army Community Hospital (MCACH) is a descriptive case study examining the most efficient and effective way to deliver ambulance services to Fort Eustis, Virginia. Currently, MCACH has a hospital based ambulance service. The cost of maintaining the current process is cost prohibitive. The study examined three alternatives to the current business process. The alternatives examined moving assets to the installation fire department, maximizing the installation's mutual aid agreement with local civilian EMS services, or contracting with a private ambulance company. The study included an examination of the external and internal environment, to include data collection from local databases, Military Health System (MHS) data systems, and the Virginia Office of Emergency Medical Service (OEMS) Pre Hospital Patient Care Report (PPCR) reporting system. A weighted decision matrix with variables representing the constructs of quality, access and cost indicated the most efficient and effective course of action was a hospital-based system. However, the study revealed that a combination of strategies would further increase efficiency.

INTRODUCTION

Management Dilemma

The changing landscape of the Military Health System (MHS) requires planners, operators and policy makers to remain good stewards of public funds. At the same time, administrators and executives are called upon to justify a need for services. An implied task for leaders is their responsibility to identify and develop systems and processes that optimize access and enhance quality to our deserving beneficiaries, while simultaneously minimizing costs. The current environment is rife for comprehensive, objective, and reflective analysis of long standing systems and processes. The classic management dilemma is whether services are to be made or bought; requiring a cost analysis for each. The management question asks whether providing ambulance services at Fort Eustis is cost prohibitive. Is there perhaps a more efficient way to deliver these services to the population while maintaining access, quality, and reducing cost? McDonald Army Community Hospital (MCACH) provides ambulance response and patient transport for the Fort Eustis community. This study will examine the most effective and efficient course of action for providing ambulance services to MCACH beneficiaries.

Conditions that Prompted the Study

Currently, the MCACH Urgent Care Center (UCC) has command and control of the Fort Eustis ambulance service. The required number of personnel on the Table of Distribution and Allowances (TDA) is 10 personnel, with nine personnel authorized. The Army Medical Department (AMEDD) Automated Staffing Assessment Model (ASAM) III predicts a manpower requirement of 18 Emergency Medical Technicians (EMT). The training level of the personnel in the section is a combination of Emergency Medical Technician-Basic (EMT-B) and Emergency Medical Technician-Paramedic (EMT-P). Fort Eustis ground evacuation assets

include three Advanced Life Support (ALS) ambulances stationed at MCACH and an additional one stationed at the Fort Eustis Fire Department (FEFD). MCACH stations the ambulance crews at the UCC and they respond to all 911 calls on the installation. The service is provided 24 hours a day, 7 days a week. From 0600-2200, two ALS crews and two ambulances provide coverage. From 2200-0600, the UCC is closed and there is one ambulance and crew on duty to respond to all response and transport calls. The FEFD staffs the fourth ambulance, but MCACH maintains and supports this ambulance, too. If MCACH requires additional evacuation assets, the FEFD provides back up coverage.

MCACH also provides ambulance services to three locations that fall within its area of coverage. The three locations are Fort Pickett, Fort Monroe, and Fort Story. Fort Pickett is a National Guard Maneuver Training Center. The Fort Pickett medical mission is an annual site support requirement from April until September; the North Atlantic Regional Medical Command (NARMC) tasks the mission to MCACH. The six-month cost to MCACH for two full time contractors and ambulance is $92K, but it is a reimbursable expense. Fort Monroe, located in the southern part of the peninsula, has a mutual aid agreement with the city of Phoebus. However, the Fort Monroe Fire Department staffs and supports Fort Monroe with one BLS ambulance at no expense to MCACH. MCACH leases the ambulance at Fort Monroe for $12K per year. The Virginia Beach Fire Department covers Fort Story on a fee for service basis. The scope of the management question only addresses Fort Eustis ambulance services.

In June 2004, MCACH staff provided an information brief on ambulance operations to the command group. The brief reported that in FY 2003, the Fort Eustis ambulance services responded to 1039 calls. Of the total number of calls, the MCACH UCC treated 22%. Transport to a nearby facility accounted for 78% of the responses. In addition, 58% of the calls had an

acuity level requiring an ALS level response. MCACH's cost of maintaining and staffing ambulance service to all sites was $685,016 (MCACH staff, public presentation, June 2004). The command group recommended further analysis of the issue.

Additionally, AMEDD leadership directed Military Treatment Facilities (MTF) to examine Emergency Medical Services (EMS) processes. On December 6, 2004, Lieutenant General Kevin C. Kiley, the Army Surgeon General, published a memorandum for the Regional Medical Commanders (RMC). The memorandum reminded RMC and MTF Commanders that the provision of EMS on an installation was solely within the purview of the hospital commander; however, he invited commanders to examine all avenues for the delivery of those services. The Surgeon General's memorandum states, "Today's changing resource-constrained environment demands examination of our business practices. We simply cannot afford to continue the current practices that some have erroneously concluded are solely the medical communities' responsibilities. We are an Army at war and thus need to make sure we are good stewards of the valuable resources given to support that mission" (MEDCOM, 2004).

Background

McDonald Army Community Hospital (MCACH)

MCACH is located at Fort Eustis, Virginia. Fort Eustis is centrally located on the Virginia Peninsula adjacent to the city of Newport News. Fort Eustis is approximately 60 miles southeast of Richmond, Virginia and 40 miles northwest of Norfolk, Virginia. Fort Eustis is an active participant in the Hampton Roads Multi-Service Market (MSM), which includes 1st Medical Group (1MDG) at Langley Air Force Base and the Naval Medical Center-Portsmouth (NMC-P).

MCACH is a 30-bed hospital that contains a myriad of services and clinics such as dermatology, orthopedics, family practice, podiatry, general surgery, gynecology, and associated

ancillary services. McDonald supports a beneficiary population of approximately fifty-eight thousand and enrolls thirty thousand in TRICARE Prime at the MTF. MCACH employs approximately 600 personnel, in FY 2004 the facility performed 1204 surgical procedures and approximately 200,000 outpatient visits to all clinics.

Regulations

EMS services on military installations are subject to regulations and standards at the Department of Defense (DoD), Department of the Army (DA), and state level. Army regulation 40-3, *Medical, Dental, and Veterinary Care*, Chapter 13, stipulates the requirements for emergency services at fixed Army hospitals. The regulation states, "all MTFs shall, during routine hours of operation, have the capability to determine if a patient care emergency exists and to initiate life and limb saving measures before providing definitive treatment or transporting the patient for definitive treatment" (DA, 2002, p.41). If the MTF does not have 24-hour operations, it stipulates, if "a facility is not open for care, arrangements shall be made to provide emergency assistance utilizing military or civilian resources. Such arrangements shall provide an EMS level of care that meets or exceeds community standards and is consistent with the facility's mission, patient requirements, and medical assets (DA, 2002, p.42)." The regulation defines facilities as Levels I-III. Levels I, II, and III have emergency departments that offer 24 hour a day coverage. However, the Health Facilities and the DOD Space Planning for Health Facilities (2004) further defines a Level IV facility (Appendix D).

In Virginia, Designated Emergency Response Agencies (DERA) are agencies considered integral to the functioning of the state, county or town for medical response services. A DERA must conform to local standards in their response to emergency services. The agency must comply with the local response time standard 90% of the time in order to remain a DERA in

good standing. Most agencies have internal standards that they strive to maintain. Virginia regulation defines two different metrics for response time, responding and mobilization. The definition of a responding interval is the time it takes from the receipt of the dispatch to the arrival of the vehicle on site. The responding interval standard is the local standard that is determined to be prudent. Unit mobilization interval is the time from the receipt of the dispatch to crew and vehicle movement to the response location. Unit mobilization interval is the prudent standard set by the agency, locality, and the department of emergency services. Staffing requirements must also be maintained in order to remain a DERA. Effective 1 January 2004 a DERA must maintain a staffing of at least eight EMT certified personnel. Additionally those agencies that have a staffing of less than 12 must submit and get an approval from the Virginia Department of Health Office of Emergency Medical Services (OEMS) that articulates their plan in maintaining 24 hour coverage (Virginia Department of Health, 2003).

The Newport News Fire Department is the primary agency that covers the area immediately outside of the installation. The department has a valid mutual aid agreement with FEFD and MCACH. In addition to public emergency services within the Fort Eustis area, there are a number of private ambulance companies. The private agencies' primary role in the delivery of services is providing inter-facility transfers. The private ambulance companies surrounding Fort Eustis are Lifeline Medical Transport, Lifeline Ambulance, Mar Mac, and Medical Transport Incorporated (The Peninsula EMS Council Inc., personal communication, August 6, 2004).

LITERATURE REVIEW

EMS History

The history of EMS is rooted in military operations. At the core of its definition, EMS is "an organized system designed to transport sick or injured patients to the hospital" (Pozner, p. 239). The first incidence of systematic medical evacuation occurred in Europe during the French Revolution, in Napoleon's Grand Army. The Grand Army instituted the concept of triage, or sorting out. A supply of soldiers of the Grand Army provided evacuation to wounded soldiers from the battlefield to rearward aid stations (O'Brien, 1998). In the United States during the American Civil War, the concept of medical transport and evacuation from the battlefield did not occur initially. During the First Battle of Bull Run, the Union Army did not plan appropriately for evacuation. Transport assets, designated aid men, and litter teams were haphazardly organized and disciplined. Once the battle appeared to turn against the Union, many horse drawn ambulance carriages and litter teams sped to the rear. The ensuing route of the Union Army by the Confederacy left wounded soldiers to suffer on the battlefield or self evacuate to the rear (O'Brien, 1998). The tragic results of Bull Run motivated Army leadership and the Sanitary Commission to examine evacuation and treatment (O'Brien, 1998; Walz, 2002; and Adams, 1996). By the end of the Civil War, both the confederacy and the union had dramatically improved evacuation, treatment, and prevention. The first military air evacuation, using a hot air balloon, occurred in Europe in 1870 during Prussia's siege of Paris (O'Brien, 1998).

Despite the obvious need for transport during wartime, the bridge to the civilian sector did not occur until 1865 in Cincinnati, followed closely by a similar system in New York. In the late 19th century, the concept of first aid training began to evolve. Mine workers from Pennsylvania, trained by the St. John's Ambulance Association, organized first aid clubs. As the

number of clubs expanded, skill competitions between the clubs grew. In 1908, the American Red Cross (ARC) integrated the lessons of the clubs' curriculum into the ARC's first medical aid textbook. The book remained the standard for first aid training and the modern first responder course is a direct descendent of the first aid clubs and the ARC textbook (Walz, 2002).

The 20th century witnessed extensive warfare and unprecedented technological achievement. Both factors drastically changed the way prehospital organizations transported and treated the sick and injured. The First and Second World War further refined military medicine, trauma care, and battlefield evacuation. The use of motorized medical transports shortened the evacuation time. Innovations and discoveries in medical science increased patient survivability. However, the lethality of weapon systems grew exponentially. Medics in the World Wars provided far forward care to their comrades. In the Korean War (1950-1953), the introduction of the helicopter and the establishment of Mobile Army Surgical Hospitals (MASH) further enhanced the American Army's ability to evacuate casualties and insert definitive care further into the battlefield. Helicopters evacuated 20,000 casualties in the Korean War (O'Brien, 1998). During the Vietnam Conflict helicopter and far forward care utilization continued to expand. In Vietnam, the helicopter evacuated 350,000 patients (O'Brien, 1998). In the Army's recent history, survivability continued to increase. Survivability has increased from 78% in Operation Desert Storm (ODS) to 89% in Operation Iraqi Freedom (OIF). Simultaneously, the amount of medical personnel deployed to the war zone decreased by 8%. Factors contributing to survivability include synchronization of tactical and strategic evacuation assets, better-trained medics, more versatile and enhanced surgical assets, and improved force protection measures (Army Medicine White Paper, 2004). Military doctors, nurses, medics, and administrators

continue to provide an important catalyst for the re-engineering of EMS delivery in the civilian sector.

Many EMS innovations also occurred in the civilian sector during the last century. In 1928, the first volunteer rescue squad originated in Virginia (Walz, 2002). In 1960, doctors James Elan and Peter Safar pioneered cardiopulmonary resuscitation (CPR) (Walz, 2002). In Belfast, Ireland, Doctors Frank Partridge and John Geddes of the Royal Victoria Hospital discovered shocking the heart or defibrillation reduced heart attack mortality rate (O'Brien, 1998 and Walz, 2002). The work of Dr. Eugene Nagel in Miami, Florida further refined the model of prehospital care. His use of firefighters trained in CPR, defibrillation, and first aid established the first paramedics. Similar training spread to other areas of the country. In the 1960s, Dr. R. Adams Crowley invented the phrase the golden hour. The golden hour is the critical 60 minutes after an injury occurs. Emergency treatment during the golden hour increases an individual's chance of survival (Walz, 2002). Additionally, the first civilian use of the medical helicopter transport occurred in 1972 in Colorado (O'Brien, 1998).

Despite the extensive medical discoveries of the 1960s, the National Academy of Sciences, the federal government and television transformed the theories of EMS from the insulated world of medical curiosity to the public agenda. The National Academy of Science (NAS) published *Accidental Death and Disability: the Neglected Disease of Modern Society.* This report highlighted deficiencies in the delivery of emergency care. Some of the more damaging discoveries were that nearly 50% of ambulances were operated by funeral homes (Walz, 2002); and only 65% of ambulance drivers had first aid training (O'Brien, 1998 and Walz, 2002).

The report prompted policy makers to pass the Highway Safety Act of 1966 and endorse the development of EMS throughout the country. In the 1970s, the newly formed Department of Transportation developed a curriculum to train medical technicians and supported the deployment of modern ambulances in the US. In 1973, the federal government further passed the EMS Act of 1973. The intention of the law was to develop cohesive emergency services throughout the country. The effort was not completely successful and failed to incorporate a nationwide system. However, the law did identify 15 aspects of an EMS systems. The Omnibus Budget Reconciliation Act (OBRA) of 1981 decreased the amount of federal money provided to EMS systems. According to Pozner, et al., OBRA further fragmented the national EMS system (Pozner, 2004). Additionally, the NBC television series, *Emergency,* which ran from (1972-1977), contributed to the public's interest in EMS services. The series chronicled the adventures and development of the EMS program in Los Angeles.

EMS Systems Today

Training

The training of ambulance drivers and EMS technicians is diverse. Training requirements fall within three general categories. EMT-Basic is the entry level certification. EMT-B personnel can respond to ambulance calls and perform basic life saving skills. The certification includes a 110-hour program. EMT-Intermediate recognizes midlevel expertise in prehospital medical services. Its training requirements vary by region. The most extensively trained EMT level is the EMT-Paramedic. Training for EMT-P involves 500-1200 hours of didactic and clinical instruction (Pozner, p. 239-244). EMT curriculum contains various components. Depending on the EMS level, areas covered in varying degree of complexity are airway, patient management, medical, trauma, special considerations (elderly and infants),

assessment-based management, and operations (Walz, p. 125-129). *EMS Education Agenda for the Future: a Systems Approach*, adopted by the National Highway Traffic Safety Administration (NHTSA) intends to enhance EMT training by requiring national accreditation of programs and certification of technicians (Walz, 2002). Figure 1 provides a model of prehospital training in the military and civilian sector. Pre-hospital training in the military does not correlate directly to the civilian sector, however the curriculum for both overlap.

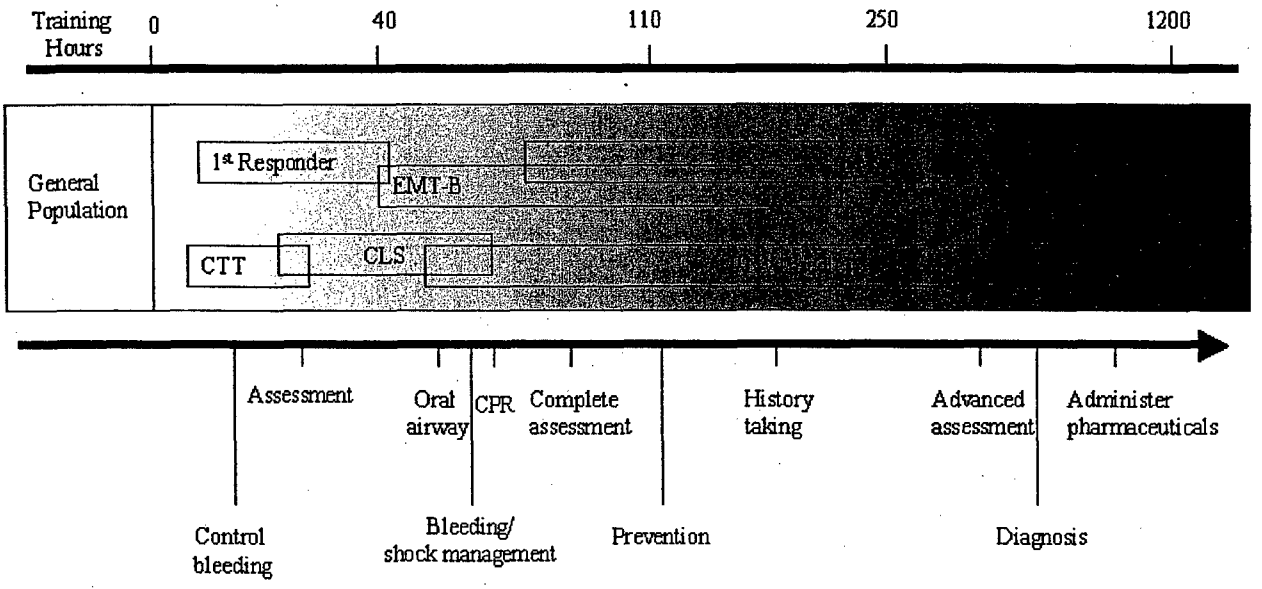


Figure 1. Conceptual model of the continuum of prehospital technicians in the civilian and military sector.

Transportation

The NHTSA adopted universal design standards in 1973. The EMS vehicle specifications code is KKK-A-1822. Ambulances that meet the specification requirements are termed Star of Life ambulances. Only ambulances meeting the requirements can display a Star of Life on the ambulance. All ambulances purchased with government dollars must meet the Star of Life specifications (Walz, 2002).

There are four general ambulance body types, types I-III and the medium duty. Type I ambulances are built on a pickup truck chassis, although the vehicle is more durable than the type II, its major disadvantage is it does not allow access from the cab to the patient compartment. Type II ambulances are converted passenger vans; they are not as resilient as type I but are the most economical. Type III ambulances provide access from the cab to patient compartment; the basic configuration is a reinforced van chassis. Type III ambulances are the most common type currently in service. The final type is the medium duty that is structurally a 1-¼ ton truck. It is the most powerful, but its size complicates the loading and unloading of patients (Walz, 2002). The type of equipment contained in an ambulance determines the vehicles' capabilities. The equipment list varies by level of services (BLS or ALS). In Virginia, the Virginia Department of Health's Office of Emergency Medical Services (OEMS) establishes the rules and regulations concerning equipment stockage list by service level. The combination of ambulance type and equipment determines ambulance category i.e. a type III ambulance with ALS equipment is an IIIA ambulance.

Communications

The two EMS communications components are internal and external. Internal communication refers to systems used by the EMS stakeholders in their delivery of services. External communication is the public's ability to access the EMS system. Internal communication focuses on synchronizing assets, incident scene communication, and medical oversight. Internal communications consist of the base or dispatch station and the mobile units executing the EMS mission. Their primary means of communication is the 800-megahertz system. The EMS radio system utilizes exclusive radio frequencies to control ambulance missions. The recent technology of trunk systems allows handheld and mobile mounted

communication systems to maintain communication with base stations across significant distances. Cellular communication is an additional tool recently available to EMS agencies. Cell phones can offer EMS agencies a secondary means of communication. The major drawback of cell phones is that in the event of a major disaster, the system could potentially become overloaded and render the system ineffective. Even more recently, the use of global positioning systems (GPS) further enhances operational control and deployment of assets (Walz, 2002).

The Virginia EMS Compliance Manual and Regulation addresses communication requirements within the state. The regulation states EMS services must be able to communicate within their catchment area or have a 25 mile range at all times using Virginia's Very High Frequency (VHF) Hospital Emergency Administrative Radio (HEAR) system. The system must be push to talk (PTT), and two-way communication between the mobile unit and a medical facility must be available (Virginia Department of Health Office of Emergency Services, 2003).

The Regional EMS Council provides further guidance on communications in the Council's 2004 Trauma Plan. The Peninsula's EMS (PEMS) Council outlines two major types of radio communications within the state. The HEAR is for routine operations within the local area. It is a very high frequency (VHF) system. The hospital to ambulance frequency is 155.400 MHz, ambulance to ambulance is 155.205, and hospital to hospital is 155.280. The second means of communications is the Consultation, Orders, and Refusals (COR) system. The COR system is an ultrahigh frequency (UHF) system and its primary function is to provide on line medical direction to ambulance crews (Peninsula's EMS Council Inc, 2004).

External communications are the public's access to EMS services. The overwhelming mode of communication for the public is 911, the universal access number. American Telephone and Telegraph Company (AT&T) established the universal access number in 1968 in response to

public and political concerns. The American Heart Association (AHA) endorses the importance of the 911 system; it is the first tenet in the AHA's chain of survival (Walz, 2002). The 911 concept allows citizen access to a Public Safety Answering Point (PSAP). Basic 911 services provide limited information to the PSAP. Enhanced 911 provides the PSAP automatic number identification (ANI), automatic location information (ALI), and directs the call to the appropriate agency. Cellular phone technology complicates the 911 system; cell phone callers do not provide enhanced 911 a location or identification. A new breakthrough is wireless enhanced 911, which provides latitude and longitude of the caller's location, but this technology is not universally available (Walz, 2002).

Another refinement of the 911 system is Dispatch Life Support (DLS). It offers a systematic and process driven approach to delivery of services. Trained emergency dispatchers utilize established procedures and protocols by asking the caller a series of questions. This system advocates efficient use of scarce EMS assets. In some areas, a subcomponent of DLS, the dispatcher, instructs the caller on life saving actions to take before the arrival of EMS services (Walz, 2002).

Demand management has also entered into the realm of the 911 system. Some areas have instituted a non-emergency number such as 311. The non-emergency number provides citizens with an alternative means of communication to the PSAP. The intent is to lessen the burden on 911 systems, especially in high volume, urban areas. Some Managed Care Organizations (MCO) use a nurse care coordinator as a call taker, requiring members to gain pre-authorization prior to calling 911. The Nurse Care Coordinator or Triage Nurse can assist the member in determining the most medically appropriate and cost effective means to deliver services (Walz, 2002).

A Fragmented System

In many respects, ambulance services in America are similar to the American Health Care system. Both are fragmented systems, in a continually changing environment (Narad, p. 49-56). EMS operates either as a health care delivery system, which includes public health, or as a public safety agency. Both definitions of emergency services have undergone increasing scrutiny when requesting financing resources. The health care sector is under tremendous pressure to correlate costs with performance. Legislators and constituents are increasingly calling upon public safety agencies to restrain spending. Tax revenue primarily finances public safety and EMS agencies, EMS agencies must compete with multiple financing priorities in the local community (Narad, p. 49-56). The suppliers of EMS are developing various techniques to adapt to the constantly changing environment. Some markets have turned to horizontal integration in order to provide services. Horizontal integration is an organization's expansion of services that the organization already provides. An example is the merger of four ambulance companies in 1991 into American Medical Response (AMR). Horizontal integration offers consolidated ambulance services the benefit of economies of scale, sophisticated management techniques, and access to capital (Narad, p. 49-56). At the other end of the spectrum, EMS has also undergone vertical integration. Vertical integration is expansion of services across the spectrum of a products delivery. An example of vertical integration is Kaiser Permanente, which contracted for EMS and call management services (Narad, p. 49-56). Kaiser Permanente has vertically integrated the EMS system from receipt of the emergency call to medical response, synchronizing all components from the call center to the injury site. Another method is full integration. Full integration is complete synchronization of all EMS assets under one provider. Full integration may result in the carve-out of all non-routine and emergency services (Narad, p.

49-56). Laidlow International Inc, the holding company for AMR, has begun moving towards full integration with bundling "emergency transportation, emergency physician staffing, and nurse triage services (Narad, p. 53)."

Organizational Structures

The organizational structures of EMS agencies are numerous. At MCACH, the service is hospital-based; a hospital owns and operates the ambulance service for the community. However, this organizational structure has declined over the years. A 2001 study in the Journal of Emergency Medical Services (JEMS) reported only 4% of systems surveyed throughout the nation utilized the hospital-based model. The public agency model is another type of organizational structure. The public agency model has many variations. The "third service" model considers EMS service distinct and separate from traditional public agencies such as police and fire departments. The 2001 JEMS study reported 11% of surveyed agencies had a third service structure. Another variation integrates EMS services within the more traditional agencies, with EMS as a branch of the police or fire department. The 2001 JEMS study reported 37% of surveyed agencies had a service attached or integrated with a fire department. Private ambulance companies are the most numerous in the United States. The 2001 JEMS survey reported 37% of ambulance services are private for profit agencies and 11% are private non-profit organizations.

The final organizational structure is the public utility model (PUM). PUM provides community ambulance service through a private contractor, but the provider is subject to governmental oversight. The contractor is responsible and accountable to the public for its performance. The focus of the model is on patient care, a positive correlation exists between the private contractor's revenue and a government's impression of how well the agency cares for its

citizens. In addition, the PUM consists of one ambulance provider to a specified geographical area. In theory, a sole provider of services can achieve low costs when demand is high (Dean, 2004). The high fixed costs of maintaining a staffed ambulance for 24 hours a day and the low variable costs such as the cost of fuel and oxygen consumed per ambulance run allow services to realize lower average costs as the demand increases. Much like a local governments traditional utilities, the PUM contains all of the essential elements of a natural monopoly.

JEMS City Survey

The Journal of Emergency Medical Services (JEMS) 2003 City Survey conducts a yearly survey of the 200 most populous cities in the country and reports on their EMS systems. This report offers a snapshot of EMS delivery trends throughout the United States. Nationally, the number of EMS responses was evenly matched between BLS and ALS crews. The survey captured systems' response and transport goals. The average goal for response time was 5:24. Additionally, the time for transportation was 8:32 minutes. Nearly 70% of EMS responses resulted in a transport. The survey results also reported that ALS level of treatment occurred in 44% of transports. The survey also reported dispatching procedures; 63% of transport units' dispatched based on the closest unit and 33% dispatched using zone coverage. The survey also reported manpower scheduling trends. The shift preference by respondents reported 46% for a 24-hour shift schedule and 33% for a 12-hour shift.

METHODS AND PROCEDURES

The literature review used a multitude of search engines. The primary journal databases used were EBSCOHOST, Ovid, and PubMed. A journal article search used the keywords "ambulance, ems, cost effective, prehospital, and quality." A query of the Google search engine used key words to locate EMS news articles, general information on EMS services, and the location of local EMS information and contacts. A search of Amazon.com identified textbooks that focused on EMS and ambulance services.

This optimization study of ambulance services is a retrospective, descriptive case study, which will focus on the demand for services as well as the efficiency of the current delivery system and the potential performance of other system options. The population of interest is the installation population. The study includes an analysis of service demand and current ambulance service capabilities. It uses various descriptive statistics for each option and conducts a thorough examination of the external and internal environments. Internal data collection is from MCACH sources and external data collection is from the Fort Eustis Fire Department, the Newport News Fire Department and private ambulance companies within the local catchment area. Statistics of interest are response and transport times, transport volume, patient acuity, cost per transport, vehicle density, and technician training. Sources of primary data are the UCC local ambulance database and data from the Virginia OEMS.

The evaluation of optimization of ambulance services at Fort Eustis requires an examination from inside and outside the organization. Specifically, examination of the external environment uses a combination of interviews and data assessments. The first area examined is the population served by the Fort Eustis ambulance section. The analysis of the Fort Eustis population includes identifying trends in the population, distribution of the workforce, mix of

civilian and military workers, and the difference between the workforce population and residential population. The primary agency used for this data collection is the Fort Eustis Garrison's Program Analysis and Evaluation Division (PA&E).

Surveying the business practices of the other MTFs will also assist in identifying potential best business practices that remain unexplored locally. A request for information to the Army Surgeon General's Emergency Medicine Consultant solicited responses from AMEDD Emergency Department (ED) doctors about their MTFs ambulance service organization and their general impressions of current ambulance services. A second survey used a convenience sample of Army Baylor Administrative Residents. The survey asked residents their MTF's ambulance organizational structure and general impressions of their current system.

At the installation level, members of the Fort Eustis Fire Department (FEFD) were interviewed. Currently, they operationally control a quarter of the installation's ground ambulance assets. Information gathering will assist in determining whether the FEFD has the capability or desire to broaden their emergency response mission. At the local level, the local EMS council has insight into the general EMS environment within the area. The focus will be on private agencies within the area that may be able to support the installation mission, if the hospital-based service discontinues.

The major external agency providing data is the Virginia Department of Health, Office of Emergency Medical Services (OEMS); the agency maintains a database of all Prehospital Patient Care Reports (PPCR) submitted to the state by ambulance services in the State of Virginia. The data request assisted in the comparison of the Fort Eustis ambulance service with other agencies within the community. The data request included calendar years 2003 and 2004. The agencies included are the Newport News Fire Department (NNFD), FEFD, and selected commercial

ambulance companies. The data call was limited to operations in the Fort Eustis Federal Information Processing Standards (FIPS) area. The FIPS code for Fort Eustis is 51700. The following data sets were chosen: location and type of injury, type of service provided, level of expertise of the attendant in charge, response times, age of the patients, mechanism of injury, injury description, signs and symptoms, treatment, level of care, destination transferred, and destination determination. The aggregate data was chosen to compare services.

The internal environment requires extensive examination. The ambulance section provided invaluable information on their processes. The section maintains an internal automated PPCR. A staff member from information management division has developed several databases within the hospital. An internal PPCR is one of the hospital's internal databases. The database contains data since January 2003. Aggregate data from calendar year 2003 and 2004 assisted with the description of the ambulance service at Fort Eustis and comparing them to the alternative options.

The Resource Management Division (RMD) assisted in providing data on the cost of leasing ambulances and the Medical Expense and Performance Reporting System (MEPRS) section provided labor data on the ambulance section. In addition, the Third Party Collection section provided Other Health Insurance (OHI) and ambulance charges. The Patient Administration Division provided ambulance service coding requirements and applicable Common Procedural Terminology (CPT) codes. The Managed Care Division provided purchased care costs and the Safety Office provided records on all accident reporting. Tools used for the study include MEPRS, Composite Health Care System (CHCS) I and II, SPSS, M2, Microsoft Access, Excel, and Word.

The options considered in the study include maintaining the status quo of a hospital based ambulance service, redistributing assets to the Fort Eustis Fire Department, reliance and expansion of the current mutual aid agreement with the Newport News Fire Department, and contracting ambulance services with a local private ambulance company. The 15 components of an EMS system outlined in the Emergency Medical Services System Act (EMSS) Act of 1973 (Public Law 93-154) provide the framework for the course of action decision criteria. Figure 2 identifies the 15 components of an EMS system and the linkage of the components to the constructs of quality and access. Cost and financial considerations were not identified as a component of an EMS system, but the study requires the inclusion of cost in order to determine the option offering the most value.

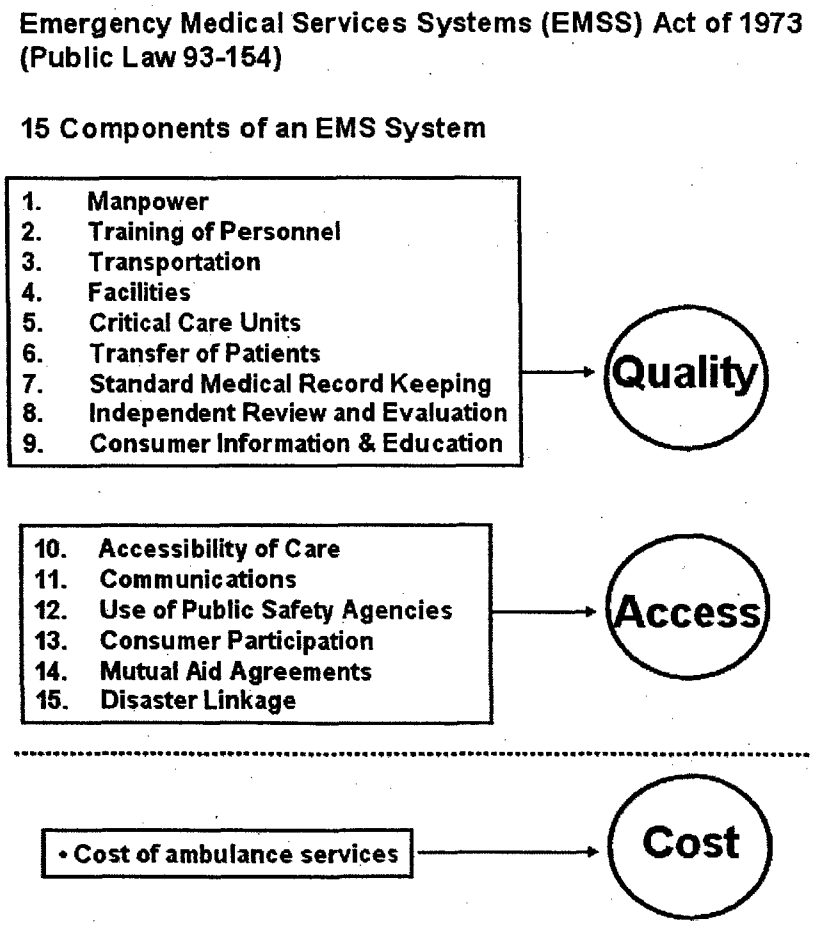


Figure 2. EMS Components and Linkage to Quality, Access, and Cost

A literature review as well as interviewing experienced members within the EMS community provided the basis of the operational definitions. Operational definitions quantify the 15 components and assist in the formulation of the study's recommendation. Operational definitions may reflect the attributes of more than one EMS component. The value of each option for two years will forecast the most cost effective alternative. Research from the EMSS Act, National Highway Transportation Safety Administration (NHTSA) Uniform Prehospital Data Set, and the International Association of Fire Fighters' quality performance indicators provided guidance on the determination of operational definitions (Mears, Ornato, Dawson, 2002; Dunford, Domeier, Blackwell, Mears, Overton, Rivera-Rivera, Swor, 2002).

The course of action tool used is a decision matrix. Each variable will have a weight and the DECMAT software program will compare each course of action. The analysis includes both the internal and external environment to offer a strategic recommendation for the delivery of services. Table 1 provides the variables for the decision matrix, the variables operational definition, and the linkage to the constructs of cost, quality, and access.

Table 1. Course of Action (COA) variables, definition, and construct supported

Variable	Operational Definition	Construct
Cost	Cost to government per ambulance run	Cost
Response	Average reported response time	Quality
EMT-P	Percentage of reported missions with an EMT-P as the attendant in charge	Quality
ALS	Percentage of reported missions providing ALS level care	Quality
Data	PPCR and regulatory compliance	Quality
EPP/CBRNE	Linkage to installation EPP plan	Access

Ex Comm	911 system sophistication and accessibility	Access
In Comm	Internal communication assets	Access

Access was weighted as the least important construct. This construct offered the smallest difference between the proposed COAs. The matrix weighed quality as the second most important variable. Cost was weighted as the most significant variable because it was the impetus of the study.

Validity and Reliability of Data

The study design considered the reliability and validity of both data and study constructs. An extensive literature review assisted in construct validity. The use of EMS performance benchmarks such as response time and level of training assisted in defining variables and linkage to constructs. In addition to the literature review, various experts in EMS systems in the military and civilian community assisted in the content validity of the study. The study design is reproducible at military installations. Examination of the data for validity and reliability also occurred. The data used in the study were primarily performance and financial. The OEMS PPCR is the State standard for reporting. Limitations of the study include PPCR reporting compliance and that the PPCR report is self-reported data. The PPCR contains the industry standards for EMS performance and the standardization of the report indicates the measurement tool is valid and reliable. Established AMEDD data systems provided the majority of financial data. AMEDD and MHS agencies constantly review the data quality of M2 and MEPRS. The financial data sources are consistent and reproducible. Various data sources feed into each system with the exception limitation of coding compliance in the data gathering process. However, the systems are the most valid method of analysis currently available.

Expected Findings and Utility of Results

The findings of the study will assist decision makers in identifying the option that offers the best value to the Fort Eustis community and the U.S. Government. A systematic examination of the external and internal environment will also offer recommendations on best practices and further refinement of the MCACH ambulance service process.

RESULTS

External Environment

Military Health System and Ambulance Services

In an effort to gain an understanding of trends in ambulance services within the Military Health System (MHS), a convenience sample of US Army-Baylor University Administrative Residents and military emergency medicine doctors was conducted using a short survey sent through email (see Appendix E). The survey asked respondents whether the ambulance services at their facility were hospital based, outsourced, or a combination of the two. The survey also asked whether their facility contemplated changing or reviewing its business process in the near future. Representatives from twenty MTFs responded. The responses represented the full spectrum of MHS MTFs and the branches of service. Sixteen of the respondents were Army facilities, three Navy hospitals, and one Coast Guard facility. Hospital based services accounted for 50%, outsourced services consisted of 40%, while 10% were a combination of two services. Almost, 70% of the hospital based ambulance services were considering a change to their business processes (i.e., outsourcing). The overall percentage of MTFs considering a business process change was 40%.

Joint Legislative Audit and Review Commission (JLARC) Findings

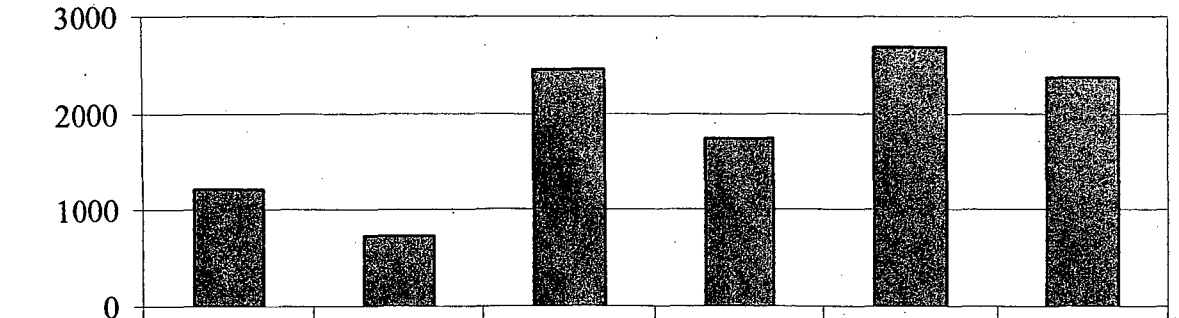
The Joint Legislative Audit and Review Commission (JLARC) of the Virginia General Assembly released House document No. 37, *Review of Emergency Medical Services in Virginia*, in November 2004. The review provided information on the state of Virginia EMS. DODI 6055.6 mandate federal installations maintain capabilities comparable to the surrounding area. One of the JLARC's findings was that a state wide standard for response time is not available, however areas across the state strive for a local response time standard. The Virginia

Department of Health's 2004 Annual Report reported a 12-minute average response time across the state. Additionally, Virginia has a higher density of ambulances than any of the other states. More than 2262 ground ambulances operate in the state. The reported 2000 population in Virginia was 7,078,515 with the state ratio of ambulances to the population served is 1:2752 (JLARC, 2004). The report also provided the state ratio of EMT-P personnel to the population of 1:2262 (JLARC, 2004).

The Fort Eustis Population

The MCACH Ambulance Section serves two populations, the working population and the residential population. The number of military and civilian workers that work on the installation is much larger than the residential population. The working population consists of permanent party military members, military students, and a civilian work force. According to the Fort Eustis Installation's Program Analysis and Evaluation (PA&E) Division, the average Fort Eustis working population for 2004 was 12,105 people. The working population is primarily Monday thru Friday between the hours of 0530-1800. The military population is 7514 or 62% of the workforce and the civilian population is 4592 or 38% of the population.

The distribution of the workforce is broken down between Training and Doctrine Command (TRADOC) activities, tenant units that are not TRADOC, military students, and civilian contractors. Figure 3 illustrates the workforce distribution of the installation in December 2004 (PA&E, 2005). The top three working populations are military students, service members assigned to tenant units, and civilian contractors. The top three populations compromised 67% of the Fort Eustis workforce population.



	Military TRADOC	Civilian TRADOC	Military NON TRADOC	Civilian NON TRADOC	Military Student	Civilian Contractors
Population	1212	724	2456	1744	2676	2376

Figure 3. Distribution of the Fort Eustis Working Population: December 2004

The working population of Fort Eustis has remained relatively constant since 2002. Data provided by the installation PA&E reveals the overall population on the installation has decreased by 5%. The military population has decreased by 9%; however, the civilian population has increased by 4%. The trend does not necessarily indicate a decrease in the military population; confounding variables such as unit deployments may explain the phenomenon.

The residential population of Fort Eustis is not as robust as the workforce population. The majority of service members live in the communities surrounding Fort Eustis such as Newport News, Hampton, and Williamsburg. The approximate monthly average of military members and their dependents assigned to Fort Eustis and in the surrounding community of Fort Eustis in 2004 was 17,991. In 2004, approximately 35% of the military population lived on post. The overwhelming majority of service members and their dependents lived off the installation.

Surrounding Ambulance Agencies

OEMS provided aggregate data for CY 2003 and 2004 for FEFD, NNFD, and Mar Mac ambulance company. Agency compliance is the major limitation of this data. Currently, reporting is voluntary; however, in the future, agency reporting compliance may determine state grant issuance (OEMS, personal communications 17 February 2005). The initial request for data from the state identified three private ambulance companies. Of the three companies, which operate in the Newport News area, only Mar Mac submitted PPCRs.

The analysis indicated a total of 1311 reports from three agencies in CY 2003 and 2004, NNFD submitted 1153 reports, NNFD 141, and Mar Mac 17. NNFD reported EMT-B thru EMT-I performed 68% of the calls and EMT-P accounted for 32%. The NNFD standard is for all EMS workers to be EMT-I certified. FEFD reported staff training certification in the reported incidents as 80% EMT-P. The Mar Mac sample was not a large enough sample but reported no incidents. The data reported average response times. The definition of response time is the time from vehicle dispatch to the arrival of the ambulance at the scene. NNFD average response time was 5:10 and FEFD reported an average of 3:59. The JLARC reported the city ratio of EMT-P providers to the population, Newport News reported a ratio of 1:2047.

All EMS personnel in the FEFD are a GS level 9 firefighter, the firefighters at FEFD work a 72-hour week. According to the General Service Pay Chart, the annual pay for a GS-9 firefighter is $65,000. The members of the FEFD EMS services are cross-trained in all sections of the department, but primary duty is as EMS providers. The workforce population in 2004 was 12,105 and the ratio of EMT-P to population was 1:1729. The estimated labor cost per year was $455,000. The Fort Eustis Fire Department uses a MCACH ambulance. MCACH pays the lease on the ambulance and the FEFD staffs the unit. The average yearly cost to lease the FEFD

ambulance from the Transportation Motor Pool (TMP) is $7,635. The unit is located in the Fort Eustis Fire Department Station House. The approximate annual cost of labor and equipment for the FEFD to provide ambulance back up EMS support to MCACH is $462,635.

MCACH Chief of Primary Care is the medical director for the FEFD. The staff of the FEFD is involved in all facets of the Installation's Emergency Preparedness Plan (EPP) and the department conducts extensive Chemical Biological Radiological Nuclear and High Explosive (CBRNE) training.

Since August 2003, the MCACH ambulance section supervisor tracked the number of emergency responses by MCACH and FEFD. A retrospective analysis of the unit revealed from August 2003 to December 2004, over a 17-month period the installation responded to 1625 emergency calls. The MCACH ambulance section responded to 1544 calls or 95% of all calls. The FEFD dispatched their unit for 81 runs or 5%. Both OEMS and MCACH collect similar data. The dual tracking systems support the reliability and validity of the data. The FEFD executed 141 EMS runs in CY 2003-2004. The FEFD estimated labor and equipment cost per run was $6562.

Commercial Ambulance Companies

The Peninsula Emergency Medical Services (PEMS) Council originally provided information on private ambulance companies operating in the Newport News/Fort Eustis area. The companies were Mar Mac, Life Line, and Life Care. The data request to OEMS included those agencies. In CY 2003-2004 only one company provided OEMS PPCR data. MAR MAC reported only 17 missions in a 24-month period. The small sample size of the commercial ambulance company is a limitation of the study.

Further research on the quality of services from the companies resulted in identification of negative citations that each agency has received from OEMS. Table 2 illustrates adverse citations levied against Newport News area commercial ambulance companies by the OEMS within the last four years. Despite obvious questions concerning quality and access, an examination of ambulance service market suggests that the uses of commercial carriers are a cost effective alternative.

Table 2. Citations levied on Newport News Area Private Ambulance Companies

Agency	Date	Citation
Life Care Medical Transport	12/ 29/2002	EMS vehicle in violation of regulatory requirement
	2/20/2003	Failure to properly secure medications
Lifeline Med Transport	3/23/2003	Failure to properly secure medications
MAR MAC	7/25/2001	Vehicle staffing Operation without an EVOC certified Operator
	10/04/2001	Record keeping Operation without an EVOC certified Operator
	2/20/2002	Record keeping Failure to maintain BLS support requirements and unsafe level of care

The Hampton Veterans Administration Medical Center (VAMC), a federal health care facility located on the Peninsula, used a commercial carrier after it discontinued its hospital-based ambulance service. The VAMC contract was not with any commercial carriers mentioned in the study. The contract supports the full range of ambulance services for VAMC. BLS and

ALS vehicles support the medical center, 24 hours a day, 7 days a week. The VAMC is the most accurate example of contracting costs to a federal facility in the Hampton Roads area.

The costs of contracted ambulance services are slightly higher than TRICARE Maximum Allowable Charge (TMAC) rates. A common concern is the increase in charges between contracts. From FY 2001-2004 contract BLS service increased 17%, ALS 35%, mileage 20%, and no load fees 66%. Estimated overall cost increases for years FY 2005-2007 are 20%. However, even with the increase in costs, applying the VAMC negotiated rates to the Fort Eustis workload in FY 2004; the cost for all ambulance services in FY 2004 would be less than $200K. .

Purchased Care Costs

Purchased care is money spent by the government on health care provided outside of MTFs. The MHS Management and Analysis Tool (M2) provides MHS planners and operators an invaluable resource. M2 allows users to query a nearly endless number of variables in order for decision makers to analyze trends and make informed choices. A query using M2 reported the amount of purchased care dollars spent on ambulance services for beneficiaries enrolled to MCACH. The data available was from 2001-2004. However, the most reliable data is 2003 and 2004 because the claims information is the most current and complete. Determining purchased care costs provide information on the amount of money spent for services used by beneficiaries in the surrounding area. I queried data by beneficiaries enrolled to MCACH and amount paid by TRICARE and OHI. The data call limited the CPT codes only to those that include ambulance services (A0060-A0436). CPT codes provide a standardized language for describing medical services supplied by health care providers. The codes assist providers, patients, and payers in communicating. Approximately 65% of military members and their dependents live in the communities surrounding Fort Eustis. In 2003, the total amount paid for ambulance services was

$63,420 for 158 ambulance encounters. In 2004, the amount was $72,629 for 168 ambulance encounters. However once air medical evacuation, neonatal transport, and specialty care transport encounters are taken out (CPT A0225, A0431, A0434, and 0436) the cost of ground ambulance missions are $32,436.12 for 148 encounters in 2003 and $35,673.62 for 160 encounters in 2004. The actual cost to the government decreased after the removal of OHI from the cost. In 2003, OHI paid $900 and collections increased to $3956.79 in 2004.

The coding for ambulance services is complicated. The cost falls into two general categories, BLS and ALS level transport. Specific codes for emergent and non-emergent transports categorize services further. The CHAMPUS maximum allowable cost (CMAC) website does not provide the rate for ambulance runs. The agency that maintains the TRICARE Maximum allowable rate is Palmetto Government Benefits Administrators (PGBA). PGBA processes all claims for TRICARE North and South and is the governments fiscal intermediary. A representative from PGBA forwarded the TMAC rate for ambulance services in Eastern Virginia. The TMAC rate for ALS ambulance service is $140 and $120 for BLS service. There is no difference in charges for emergent and non-emergent services. Ambulance companies also charge for mileage. The TMAC rate is $3.75 a mile. The charges for mileage in 2004 was $4,600 and the average charge per ambulance service was $28.95. The charges indicate that the average ambulance run was 8 miles. Other ambulance CPT codes specify services provided such as charges for disposable supplies. Table 3 illustrates ambulance service CPT codes and TMAC rates for services provided to MCACH TRICARE Prime beneficiaries. Further examination of the purchased care dollars revealed the majority of the claims mirrored the TMAC rate provided by PGBA.

Table 3. Common Procedural Codes and TMAC Cost

Code	Description	Cost per episode ($)
A0225	Neonatal transport, ground	1876
A0382	Ambulance Service, BLS ground disposable supplies	30
A0394	ALS specialized service disposable supplies, IV therapy	41
A0398	ALS routine disposable supplies	50
A0422	ALS or BLS Oxygen and supplies	20
A0425	Ground mileage	3.75
A0426	ALS non emergency transport	140
A0427	ALS emergency transport	140
A0428	BLS non emergency transport	120
A0429	BLS emergency transport	120
A0431	Ambulance service; rotary wing	4424
A0434	Specialty Care Transport	717
A0436	Rotary wing mileage	55

Installation Internal Communications and 911-System

The FEFD maintains the Installation Public Safety Answering Point (PSAP) and responds to all Fort Eustis 911 calls. The FEFD has 800-megahertz capability and shares that capability with the MCACH ambulance service. Currently, the FEFD pays the city of Newport News $5,000 annually for the use of its transmission towers. The FEFD also has HEAR capability. The FEFD is DERA qualified by OEMS, however the FEFD PSAP is not state certified. The state certification requires 25% of dispatchers to be trained through an approved

emergency medical dispatch program, a continuing education program, quality assurance letter and a yearly submitted assurance statement to the OEMS (VDH, 2004). The state certification does not have an effect on the decision criteria. State certification is voluntary, however certification indicates an established standard with the EMS system.

Access to the 911-system is achieved by three methods: cell phone, calls placed from phones on post with an 878 prefix, and all other installation phone numbers. Phones with an 878 prefix are primarily located at installation tenant and activity buildings. Other phone prefix phone numbers are primarily located in the installation's housing areas.

The major responding agencies in the installation system are MCACH ambulance service, FEFD, and NNFD. A cell phone caller on post calling 911 transmits the call to the nearest cell phone tower. The location of the tower determines the receiving PSAP. The NNPD PSAP, located at the Newport News Police Department (NNPD), or the Virginia State Police PSAP receives the call. The Newport News PSAP forwards the call to the NNFD. The NNPD PSAP is the only state accredited PSAP in the chain. The NNFD contacts FEFD, which contacts MCACH and Fort Eustis Military Police (MP) for response. The NNPD has both 911 enhanced and 911 enhanced wireless capabilities. If the caller makes the call from a phone number other than 878, the system routes the caller to the Newport News PSAP, which forwards the call to FE PSAP. An 878 911 call is the most direct route to the Fort Eustis PSAP. The Fort Eustis system currently provides 911 basic service. Currently none of the PSAPs in the area use DLS. The current Fort Eustis standard operating procedure (SOP) dispatches FEFD, FEMP, and MCACH to respond to 911 calls. The most advanced system is the Newport News PSAP, followed by the FEFD, while MCACH response is dependent upon other agencies for notification. Figure 4 illustrates the communication flow for 911 calls on Fort Eustis.

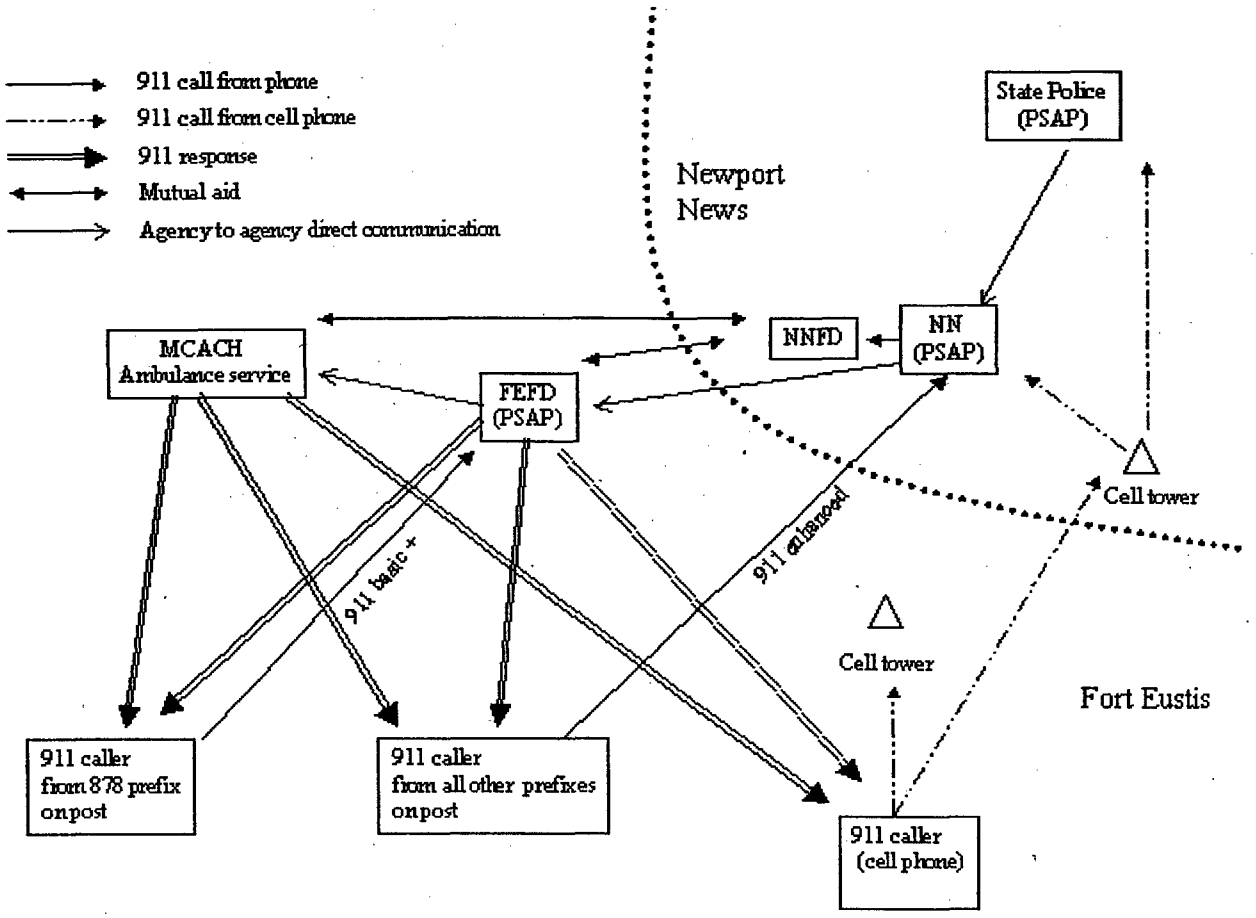


Figure 4. Fort Eustis 911 Communication Flow

Internal Environment

MCACH Ambulance Service Descriptive Statistics

Since January 2003, the MCACH ambulance section has collected data on ambulance runs. The primary tool used is an Access database that replicates the fields of the Pre-hospital Patient Care Report (PPCR). In CY 2003, the ambulance section reported 1043 ambulance missions. The number of missions rose to 1198 in CY 2004. This indicates a 15% increase in the number of reported runs. The population served had not increased. The most likely explanation for the increase was improved data reporting by the Ambulance Section. In 2004, the classification of nearly half of the calls to the ambulance section was for medical care (46.5%), routine transfers accounted for 17.7%, trauma 15.6%, and emergency transfers 12%.

The response time for ambulance services consists of multiple steps. Times are recorded from the time of the call, dispatched time, time of movement, arrival time at the scene, arrival to the patient, leaving the scene, and arrival at destination. Table 4 compares the average response and transport times for CY 2003 and 2004. Response times significantly increased from 2003 to 2004. The response time, from the time of the initial call until the unit arrives at the scene, has increased by 19 minutes on average. The average time to locate the patient once the unit has arrived, the amount of time actually spent at the scene, and the transport time to the destination has remained primarily unchanged.

Table 4. MCACH Ambulance Section Response Time Breakdown (CY 2003 and 2004)

	Average Minutes	
Event	2003	2004
Call Received	2	6
Call Received/Unit Unit Enroute	3	11
Unit Enroute Arrive Scene	6	13
Arrive Scene/Arrive Patient	5	6
Arrive Scene/Leave Scene	18	17
Left Scene/Arrive Destination	25	25
Total mission time	59	78

PPCR reports the technical level of the attendant in charge of the ambulance mission. In 2004, 67% of the missions had a paramedic in charge. This is lower than the 2003 percentage of 72%, but this percentage is higher than the national average of 50%. Additionally, the PPCR reports the mechanism of injury that caused the call. In 2003, 220 ambulance missions reported

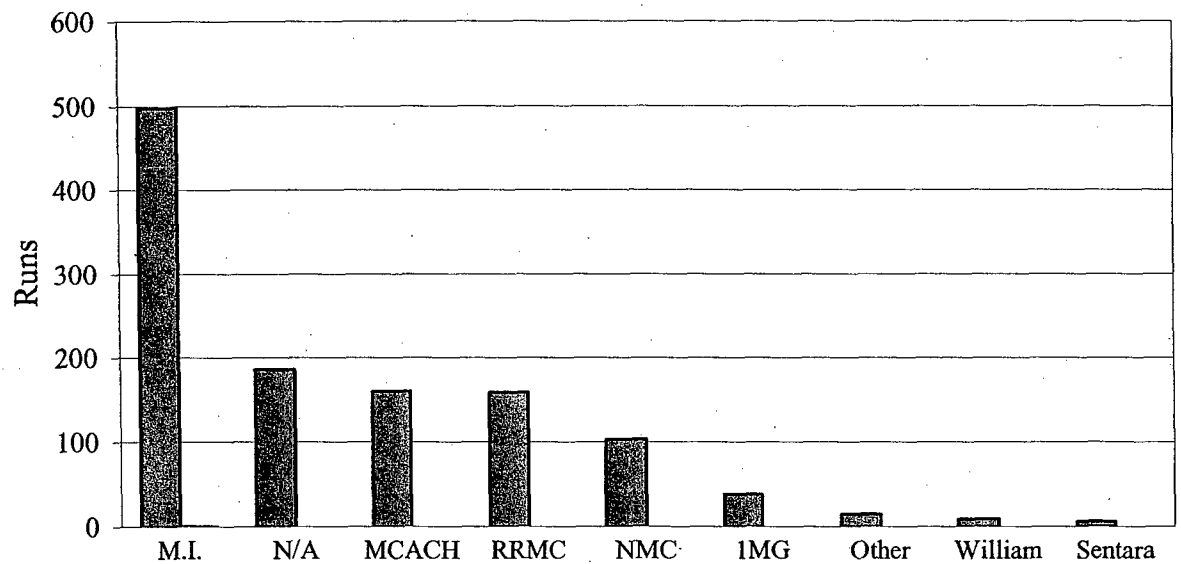
a mechanism of injury, the number in 2004 decreased to 187. Five injury classifications contributed to the majority of the calls. Falls and motor vehicle accidents were the major causes of injury for both years. The top five causes accounted for 68% and 88% of injury causes in 2003 and 2004. Table 5 provides the number of reported injuries on Fort Eustis in CY 2003 and 2004.

Table 5. MCACH top 5 reported injuries CY 2003 and 2004

	2003		2004	
Injury Type	Number	Percent	Number	Percent
Fall	50	23	43	23
Motor vehicle accident Public road	33	15	55	29
Other	23	11	28	15
Sports injury	21	10	14	8
Assault	20	9	24	13
Total	147	68	164	88

The PPCR also categorizes the ambulance run type and records the destination of the patient. The 2004 data reported run types for 1169 missions. Patient transport and transfer missions accounted for 49%, or 573, of the missions. Emergency runs accounted for 35% or 410 missions. On-site response accounted for 16%, or 186, of the missions. Nearly half of all missions conducted by the MCACH ambulance section are for patient transports or transfers. The mission type breakdown was similar in 2003 with transports and transfers accounting for 56% of the missions, emergency runs at 35% and on site response at 9%.

The PPCR statistics also indicate that MCACH is rarely the destination of the ambulance runs. In 2004, the overwhelming destination was Mary Immaculate (MI) Hospital, the closest civilian hospital to MCACH. MI is six miles from MCACH; Riverside Regional Medical Center (RRMC) is 13 miles away and is the only level II trauma center on the Peninsula. Distance to NMC-P is 40 miles, Langley Air Force Base is 20 miles, Williamsburg Community Hospital is 18 miles, and Sentara CarePlex is seven miles from MCACH. Figure 5 illustrates the destination hospital of ambulance missions conducted by the MCACH ambulance section.



	M.I.	N/A	MCACH	RRMC	NMC	1MG	Other	William	Sentara
Missions	498	186	160	159	103	38	15	9	6
Percentage	43%	16%	14%	14%	9%	3%	1%	1%	0%

Figure 5. The Mission Destinations in CY 2004 of MCACH Ambulance Missions

Labor

The ambulance section TDA has a requirement for nine personnel and authorizations for eight. The planning factor is 168 hours a month equals a full FTE. The ASAM III model recommends a staffing of 18 personnel. The section is authorized an EMS supervisor and a

combination of EMT-B and ALS personnel. The pay scale for the supervisor is a GS-9; GS–7 for EMT-P personnel, and GS-6 for EMT-B certification. In reality, the ambulance section in FY 2004 had a staff of twenty-one personnel assigned. The section had one ambulance section supervisor, 16 EMT-Ps, and 4 EMT-Bs. The staffing level in the past fluctuated, but had remained constant over FY 2004. In FY 2003, personnel staffing ranged from eleven to twenty two. The staffing of the section consists of both full time and part time personnel. Many of the staff members are EMTs in the local community at either fire departments or ambulance companies. The MCACH ambulance section provides an opportunity to work on a part time basis. The personnel hours range from .15 to 1 FTE or 25 to 168 hours per month. The section maintains 24-hour operations. Two ambulances are staffed and on station from 0600-2200. One ambulance is staffed from 2200-0600. The average labor hours required for coverage is 29,200 hours per year or 2,433.33 hours per month. In FY 2004, the total hours worked by the section was 26,367.5 hours. Approximate labor costs for FY 2004 was $420,878.

Using the Medical Expense and Performance Reporting System (MEPRS) the section reports which Functional Cost Code (FCC), or section, the personnel work in, by hour. The ambulance section is collocated with the MCACH Urgent Care Center (UCC) and between ambulance runs the section assists the UCC staff with patient care. The UCC fourth level FCC is BHIA and the ambulance section FCC is FEAA. In FY 2003, the staff worked the equivalent of 11.51 FTEs in both clinics. Workload in the UCC accounted for 85% of the ambulance sections available hours. In FY 2004, the twenty-one member staff worked the equivalent of thirteen FTEs in both clinics.

Examination of the hours dedicated to the ambulance section and the number of ambulance runs provided a statistically significant correlation ($p>.05$). The correlation implies a

relationship with the number of emergency runs made and the labor hours dedicated to the ambulance section. Figure 6 is a scatter plot of ambulance runs per month and available hours worked in FEAA. Although not statistically significant, there is a negative correlation between the number of emergency runs and total hours worked by the ambulance section staff.

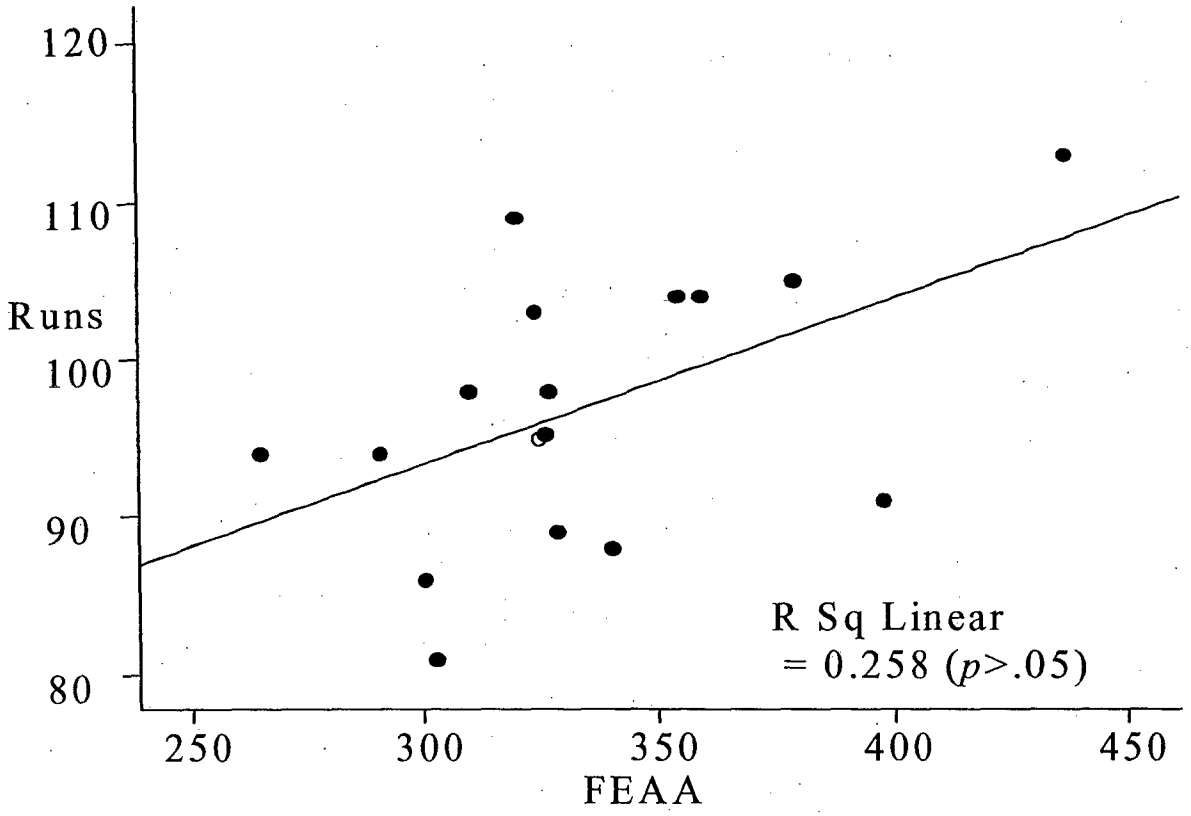


Figure 6. FEAA (Ambulance FCC) Dedicated Hours and Number of Emergency Runs (August 2003-November 2004)

Equipment

MCACH maintains three Type III ambulances. The combined average yearly lease cost for the ambulances is $23,490. The total labor and equipment cost for FY 2004 was $444,368. The average cost per run in 2004 was $380 dollars per run.

Third Party Charges

In certain instances, MCACH is able to charge insurance companies for its ambulance services. An action memo dated September 24, 2004 from the Chief Financial Officer (CFO) of TRICARE Management Activity (TMA) outlined the rates a facility can charge for ambulance services. Tab B, section 3.5.1 stipulates the transportation charges. The basis of the charges is time. Facilities can charge for ambulance services in 15-minute intervals. Common Procedural Terminology (CPT) code A0999 is the code used for ambulance services. The rate per 60 minutes is different for International Medical Education and Training (IMET), Interagency Rate (IAR), and Third Party or Other Health Insurance (OHI). Rate for 60-minute service is $60 for IMET, $104 for IAR, and $110 for OHI. Basis for charges are 15-minute increments and "MTFs shall calculate the charges based on the number of hours (and/or fractions of an hour) that the ambulance is logged out on a patient run. Fractions of an hour shall be rounded to the next 15-minute increment" (TMA, 24 September 2004). The rates determined by the CFO are a decrease in charges from FY 2004. In FY 2004, the rate was $102 for IMET, $140 for IAR, and $147 for OHI. This represents a decrease of 25% for IAR and OHI.

The Decision Matrix

The DECMAT is a computer program used for analyzing options based upon objective data. The four options are maintaining a hospital based ambulance service (MCACH), moving operations to the FEFD, relying upon Newport News Fire Department (NNFD) for ambulance support, or contracting for ambulance services (CONTRACT). The DECMAT used relative value weights of each variable. The variable weighted the heaviest was cost per ambulance run, followed by four quality variables, and three access variables. The impetus of the study was to maintain a focus upon cost, therefore cost was weighed the highest, also the construct of cost

consisted of only one variable. Quality was the second construct in the weighing matrix in regards to ambulance services, of the quality variables response is the industry standard for the measurement of ambulance performance. Training and equipment was weighed next, the training level of personnel was weighed heavier than equipment because of the two variables training is more difficult to achieve and sustain. Virginia and MCACH have difficulty retaining qualified EMT-P. The final quality variable was data reporting and compliance. Data gathering is an integral part of a quality assurance program. Three variables defined the access construct. Linkage and relationship to the Fort Eustis Emergency Preparedness Plan (EPP) weighed the heaviest, the hospital has specific tasks linked to the installation EPP plan. Mission accomplishment during significant events requires ambulance availability and accessibility. The public's access to ambulance services are an integral component of public safety and the delivery of ambulance services, therefore inter and intra agency communications was not weighed as heavily as public access.

The first variable was the cost per ambulance run. The cost per run was determined for each option by using historical cost data for the contract option and labor costs for the remaining options. The average purchased care cost of ambulance runs was $197 for all ambulance runs. The cost per run was highest at FEFD with an average cost of over $6000 per run; MCACH was a distant second with an average cost of $380 per run. NNFD was the third with a cost of $197 per run; the least expensive was the use of a contracted ambulance service with a TMAC base cost of $120 for BLS runs and $140 for ALS runs.

The first and heaviest weighted quality variable was response time. The response time was the elapsed time between vehicle dispatch and arrival on scene. The average response time in the state of Virginia was 12 minutes (Virginia Department of Health, 2004). The agency with

the shortest average response time in CY 2003 and 2004 was FEFD with a response time of 3:59 minutes, NNFD was next with an average time of 5:10, MCACH was third with a response time of 9:46 minutes, and Contract was fourth with a response time over eight hours. The second quality variable was the percentage of missions with an EMT- P as the attendant in charge. FEFD was first with an EMT-P percentage of 80%, MCACH had 69%, MAR MAC 50%, and NNFD had 25%. The third variable was the percentage of services where the level of service provided was ALS. The MCACH was first with 54%, FEFD was second with 46%, NNFD 31%, and MAR MAC 0%.

The final quality variable was data quality and compliance, measured by an agency's ability to adhere to PPCR, record keeping, and state regulations. The agency that has the most extensive data collection is MCACH. The agency has self-reported 2242 PPCR events in CY 2003-3004 into their local database. Although reporting to the state is optional, FEFD does submit ambulance run data to the state. In 2003-2004, FEFD submitted 141 reports, NNFD is third with over a thousand submissions but some data fields are missing. The MAR MAC is third. In addition, all local private ambulance companies in the area have received citations from the state in the last four years. Citations range from failure to have a qualified operator, failure to secure medications, records keeping, and unsafe level of care (OEMS, 2005).

Access was the final construct and consisted of three variables: 911 access, EPP linkage, and internal communications. The most elaborate 911-system is the NNFD with the ability to have 911 enhanced and wireless enhanced capabilities, also their PSAP and dispatchers are state certified. FEFD has 911 basic and MCACH must rely upon outside agencies for communication and information. Of all agencies, the FEFD demonstrates the strongest linkage to the installation EPP plan and disaster planning. MCACH also participates regularly in EPP planning and

rehearsals, the NNFD have a mutual aid agreement with Fort Eustis but the agency is not a direct stakeholder in the EPP process. Internal communications are similar in all organizations, all work on an 800 megahertz communication system, have access to the HEAR system, and use cells phone for secondary means of communications. Figure 7 outlines the decision matrix and the results of each option.

DECISION MATRIX Ambulance Services

Weight	4.58	3.08	3.08	2.69	1.98	1.67	1.20	1.00	Total
Criteria / COA	Cost	Response	EMT/P	ALS	Data	EPP/CBRNE	Ex Comm	In Comm	
MCACH	2	3	2	1	1	2	3	1	37.207
FEFD	4	1	1	2	2	1	2	1	38.912
NNFD	3	2	3	3	3	3	1	1	50.397
Contract	1	4	4	4	4	4	4	1	60.452

Relative Values Matrix
Less is better
Consistency Ratio = 98.69

Figure 7. Ambulance Service COA Matrix

DISCUSSION

In the discussion of ambulance services, the question asked is "what is the cost of readiness?" Readiness is a construct whose return on investment may never occur, but steps can mitigate and increase the value of ambulance services at Fort Eustis.

The decision matrix revealed that the hospital-based system currently used provides the best value. The current business process could be further refined to reduce costs and increase efficiencies. In our discussion, cost has two perspectives. From the perspective of the MCACH, the best option is to shift all services to FEFD. In the construct of quality, FEFD was the best option and shifting operations to FEFD would reduce costs to the MTF, but would increase costs to the installation. In the development of this study, stewardship of the federal dollars was the intent, not shifting costs to another federal agency. The most significant cost for ambulance services is labor. The ambulance service at Fort Eustis spends the majority of its time (85%) supplementing the workforce in the UCC. EMS operators should focus efforts and labor on activities that enhance the performance of the ambulance services. The duties of the EMS operators in the UCC are primarily those habitually accomplished by medical assistants (MA). In the Civil Services system, MAs are typically a GS-5 pay grade. In FY 2004, the difference in labor costs considering hours worked in the UCC by EMS operators performing MA duties and MAs conducting the duties was $60,000.

The introduction of an injury prevention program at MCACH, spearheaded by the Ambulance Section, is a more efficient use of labor resources. EMS and ambulance services are increasingly involved in injury prevention. None of the options in the study had a robust prevention program. The use of ambulance staff in prevention efforts is a logical utilization of assets. Ideally, the realized benefits of an injury prevention program are recognized before the

benefits of a prevention program focused on chronic conditions. Emory University School of Medicine has developed a prevention curriculum for EMS agencies called "Accidents Aren't". The program challenges the traditional role of ambulance services as emergency treatment and transport and promotes a view of EMS as a health community resource. EMS services are a natural link among the medical community, public safety, and citizens (Yancey, A., Martinez, R., Kellerman A., 2002). Yearly, JEMS awards an EMS agency with an award for the most effective prevention program. The concept of combining injury prevention and EMS is new, but innovative and data driven strategies on injury prevention will ultimately assist in reducing demand for EMS services.

In addition to realigning labor priorities, installation assets can assist in mission support. The FEFD ambulance is underutilized. They have 25% of the installation evacuation assets but conduct only 5% of the missions. The common reasoning made is that FEFD provides the last line of evacuation assets on post. However, in reality FEFD and MCACH have mutual aid agreements with NNFD. Greater utilization of FEFD assets will decrease staffing demands at MCACH.

Decrease staffing could offer significant cost savings and still provide quality care to the population. Decreasing staffing to one manned ambulance from 0600-2200 and discontinuing the night shift (2200-0600) would save the MTF approximately $283,298 in labor costs. The estimate is based upon one ambulance with a two-member crew, 48 hours a day for 365 days at a GS 7 step five hourly rate of $16.17.

Appropriate UCC staffing and contract establishment would benefit from the cost savings. In today's environment, an installation cannot completely abdicate its EMS to a private company. Installations must maintain a level of autonomy and train for installation specific

events. However, the study mentioned the questionable quality and access that private companies may provide but in certain instances, using private companies to transport and transfer BLS or low acuity patients to area hospitals is prudent and efficient. Using FY 2004 data, the MCACH ambulance service executed 409 BLS missions. Using the average purchased care costs of $197, it is reasonable to assume the cost of contracted BLS transports is forecasted at $80,573. This would allow MCACH ambulance services to provide services for more acute calls.

If implemented correctly, contracting services enhances quality. Lessons learned from other installations could prove helpful. Fort Sam Houston currently contracts for all ambulance services. The former Chief of Brooke Army Medical Center Emergency Services recommends performance measures such as stipulating response times in the contract and allowing no more than a 10% variation, the contract could also include a provision that requires a member of the MCACH Clinicial staff to function as the service's Medical Director. Additionally the Richmond Ambulance Authority (RAA), a public utility model, penalizes carriers that do not achieve response times; also, a contract could penalize contractors that receive citations from OEMS. The RAA also provides performance incentives for private companies. A well-written contract that includes penalties and incentives can assist in quality compliance. A limitation in contracting for services is "no load" fees. A no load fee is an industry business practice, it occurs when an ambulance company dispatches an ambulance, the ambulance arrives at the hospital but the patient is not present or ready for transport. The ambulance company bills the hospital for response expense. As a result, requesting transport by an ambulance contractor requires sound management practices.

The EMT-P percentage in MCACH is high, but concern about the staffing warrants mention. Many of the staff members are part time employees whose full time job is in a fire department in the surrounding cities and towns. If a true regional incident occurred, the reliability of part time staff is undermined. The ambulance section may benefit from recruitment and retention campaign focusing on full time members.

MCACH's response time is better than the state average of 12 minutes, but there remains room for improvement. Decreasing UCC utilization and contracting less acute missions can assist in the service focusing on performance measurements. MCACH currently leases three ambulances. In CY 2004, the mileage utilization of all three ambulances was approximately 20,000 miles. The decrease in workload would allow the release of one leased ambulance with a cost savings of approximately $7,000 a year.

Submission of the PPCR to the OEMS is an area in which improvements also can occur. In the near future, it is likely that the EMS community will adopt a national standard for EMS reporting. MCACH currently maintains a local database of PPCR; reporting compliance would allow management to better benchmark performance with other EMS agencies.

The reduction in staff and equipment, as well as a contract with private ambulance services would save the facility approximately $209,000 a year with no change in quality or access but result in an increase in efficiency, readiness, and value.

CONCLUSION

The hospital based ambulance service is the most effective and efficient use of government resources. However, process improvements in current operations will further enhance operations. In the external environment, installation support for increasing FEFD ambulance service and contracting with a local ambulance service for low acuity transports and transfers will provide a cost reducing effect on labor costs in the ambulance section. In the internal environment, the section's labor resource should shift efforts from the UCC to EMS focused activities. Reduce staffing to one ambulance crew between the hours of 0600-2200 and discontinuing coverage between 2200-0700 will reduce labor costs and the hospital can reduce its ambulance density by one vehicle.

The management question of the most efficient way to deliver ambulance services is not a new management dilemma for MCACH, but this is the first comprehensive examination of the issue at Fort Eustis. Appropriate staffing, leveraging of market forces, equitable utilization of installation assets and innovative prevention efforts will result in considerable cost savings to MCACH.

Appendix A – MEDCOM EMT Memorandum

DEPARTMENT OF THE ARMY
HEADQUARTERS, U. S. ARMY MEDICAL COMMAND
2050 WORTH ROAD
FORT SAM HOUSTON, TEXAS 78234-6000

REPLY TO
ATTENTION OF

MCCG

06 DEC 2004

MEMORANDUM FOR Commanders, MEDCOM Regional Medical Commands

SUBJECT: Emergency Medical Transport (EMT) Services

1. Medical Command (MEDCOM) Regulation 10-1 outlines a requirement for the Director of Health Services (DHS) to "provide for the centralized management of all activities of coordination of health care for eligible beneficiaries."

2. I am requiring each Regional Medical Commander to ensure their military treatment facility (MTF) Commanders execute at least a management role in the provision of EMT services on their installation and coordination of 24/7 EMT for the enrolled military health system population.

3. Management can include reviewing any of the parameters for the most effective or most efficient use of personnel, supplies, vehicle lease, vehicle maintenance, contract costs, and revised financing costs of both current and alternative (more cost effective) sources for provision of the service. You are not limited to current arrangements. You must, however, ensure that any proposed means of providing Emergency Medical Services (EMS) is acceptable from a quality management standpoint.

4. I am expecting each DHS to ensure the best business practice that satisfies your community standards for EMT in view of the very tight budget year. The DHS will be responsible for planning the provision of EMT, utilizing Department of Defense, Department of Veterans Affairs, or civilian resources. This memorandum is not authorizing additional monies or removing monies that have been traditionally assigned to the task of providing EMT.

5. If your facility is not open 24/7, Army Regulation 40-3, Medical, Dental, and Veterinary Care, para 13-3a (4), simply states, "Arrangements are made to provide emergency assistance utilizing military or civilian resources. Such arrangements shall provide an EMS level of care that meets or exceeds the community standards and is consistent with facilities' mission, patient requirements, and medical assets."

6. Today's changing resource-constrained environment demands examination of our business practices. We simply cannot afford to continue the current practices that

MCCG
SUBJECT: Emergency Medical Transport (EMT) Services

some have erroneously concluded are solely the medical communities' responsibilities. We are an Army at war and thus need to make sure we are good stewards of the valuable resources given to support that mission.

KEVIN C. KILEY
Lieutenant General, MC
Commanding

Appendix B- Prehospital Patient Care Reports

COMMONWEALTH OF VIRGINIA
PRE-HOSPITAL PATIENT CARE REPORT HEALTH DEPARTMENT FORM # **M0000000**

Incident # [ ] Incident in CITY ☐ COUNTY ☐ of: ______ FIPS [5|1| | |] [ ] DATE

Agency ______ Agency # [ ] Unit # [ ] Agency Use # [ ]

Incident Location ______

TIMES (24 Hour Format)

	TIME OF CALL
	DISPATCHED
	RESPONDING
	ARRIVE SCENE
	ARRIVE PATIENT
	LEAVE SCENE
	ARRIVE DESTINATION
	LEAVE DESTINATION
	RETURN SERVICE

LOCATION TYPE		TYPE OF SERVICE	INCIDENT DISPOSITION	
1 Home/Residence	7 Public Building	1 Scene	1 Treated, Transported EMS	6 Patient Refused Care
2 Farm	8 Residential Institution	2 Unsched Interfacility Transfer	2 Treated, Transferred Care	7 Dead at Scene
3 Mine/Quarry	9 Educational Institution	3 Sched Interfacility Transfer	3 Treated, Transported Private Vehicle	8 Cancelled
4 Industrial Place/ Premises	10 Other Specified Location	4 Standby		9 No Patient Found
	11 Unspecified Location	5 Rendezvous	4 Treated and Released	NA Not Applicable
5 Recreation Place	NA Not Applicable	NA Not Applicable	5 No Treatment Required	U Unknown
6 Street/Highway	U Unknown	U Unknown		

AIC (print)______ CERT # ______ FR EMT ST CT I P RN MD OTH NA Signature ______

ATTENDANT 1 (print)______ CERT # ______ FR EMT ST CT I P RN MD OTH NA Signature ______

ATTENDANT 2 (print)______ CERT # ______ FR EMT ST CT I P RN MD OTH NA Signature ______

DRIVER (print)______ CERT # ______ FR EMT ST CT I P RN MD OTH NA Signature ______

Patient's Name ______ SSN [ ]
Address ______
City ______ State ____ Zip [ ]-[ ]
Spouse ______ Parent/Guardian ______
Other Address ______
Allergies ______
Med ______

Patient's FIPS [5|1| | |]
AGE [ ] ☐Year ☐Mon ☐Day ☐Unk
DOB [ ]
WT [ ] ☐LB ☐KG
Race Code [ ]
Gender Code [ ]

Patient's Physician ______
Other Personnel ______
Fire ______
Law Officer ______
CHIEF COMPLAINT:

TYPE OF CALL		PRE-EXISTING CONDITION		
1 Accident/Industrial/Construction	7 Mutual Aid	1 Asthma	7 Chronic Renal Failure	0 Other:
2 Accident/MVC	8 Public Service	2 Diabetes	8 Cancer	
3 Assault	9 Standby	3 Tuberculosis	9 Hypertension	
4 Fire	10 Transport/Routine	4 Emphysema	10 Psychiatric Problems	
5 Injury Not Listed	0 Other:	5 Chronic Resp Failure	11 Seizure Disorder	NA Not Applicable
6 Medical Emergency		6 Heart Disease	12 Tracheostomy	U Unknown

HISTORY OF PRESENT ILLNESS/PHYSICAL EXAM/OTHER INFORMATION: ______

1 min APGAR: ______ 5 min APGAR: ______ BURN %: ______

Time	LOC	Pulse	Respirations	BP	Perfusion	Pupils	EKG	Defib Joules	O2 sat	Glucose	GCS Score
	☐ Alert ☐ Voice ☐ Pain ☐ Unresp	Rate: ☐Not Obtained ☐Unable To	Rate: ☐Not Obtained ☐Unable To ☐ Normal ☐ Increased, not labored ☐ Increased/labored OR Decreased/fatigued ☐ Absent	/ ☐ Palpated ☐ Not Obtained ☐ Unable To	☐ Normal ☐ Decreased ☐ Not Obtained	☐ PERL ☐ R > L ☐ L > R ☐ DIL ☐ CON ☐ UNREACT					EYE: VERBAL: MOTOR: TOTAL:
	☐ Alert ☐ Voice ☐ Pain ☐ Unresp	Rate: ☐Not Obtained ☐Unable To	Rate: ☐Not Obtained ☐Unable To ☐ Normal ☐ Increased, not labored ☐ Increased/labored OR Decreased/fatigued ☐ Absent	/ ☐ Palpated ☐ Not Obtained ☐ Unable To	☐ Normal ☐ Decreased ☐ Not Obtained	☐ PERL ☐ R > L ☐ L > R ☐ DIL ☐ CON ☐ UNREACT					EYE: VERBAL: MOTOR: TOTAL:
	☐ Alert ☐ Voice ☐ Pain ☐ Unresp	Rate: ☐Not Obtained ☐Unable To	Rate: ☐Not Obtained ☐Unable To ☐ Normal ☐ Increased, not labored ☐ Increased/labored OR Decreased/fatigued ☐ Absent	/ ☐ Palpated ☐ Not Obtained ☐ Unable To	☐ Normal ☐ Decreased ☐ Not Obtained	☐ PERL ☐ R > L ☐ L > R ☐ DIL ☐ CON ☐ UNREACT					EYE: VERBAL: MOTOR: TOTAL:
	☐ Alert ☐ Voice ☐ Pain ☐ Unresp	Rate: ☐Not Obtained ☐Unable To	Rate: ☐Not Obtained ☐Unable To ☐ Normal ☐ Increased, not labored ☐ Increased/labored OR Decreased/fatigued ☐ Absent	/ ☐ Palpated ☐ Not Obtained ☐ Unable To	☐ Normal ☐ Decreased ☐ Not Obtained	☐ PERL ☐ R > L ☐ L > R ☐ DIL ☐ CON ☐ UNREACT					EYE: VERBAL: MOTOR: TOTAL:

MECHANISM OF INJURY	SIGNS AND SYMPTOMS	PROVIDER IMPRESSION	PROCEDURES	A S Cert Number
1 Aircraft Related Accident	1 Abdominal Pain	1 Abdominal Pain/Problems	1 Assisted Ventilation (BVM)	
2 Assault	2 Back Pain	2 Airway Obstruction	2 Assisted Ventilation (Positive Pressure) RATE: Min.	
3 Bicycle Accident	3 Bloody Stools	3 Allergic Reaction	3 Chest Decompression	
4 Bites	4 Breathing Difficulty	4 Altered Level of Consciousness	4 Cricothyrotomy	
5 Burns/Thermal/Chemical	5 Cardioresp Arrest	5 Behavioral/Psychiatric Disorder	5 EGTA/EOA/PTL	
6 Chemical Poisoning	6 Chest Pain	6 Cardiac Arrest	6 ET	
7 Drowning	7 Choking	7 Cardiac Rhythm Disturbance	7 Nasal Airway	
8 Drug Poisoning	8 Diarrhea	8 Chest Pain/Discomfort	8 NG Tube	
9 Electrocution (non-lightning)	9 Dizziness	9 Diabetic	9 Oral Airway	
10 Excessive Cold	10 Ear Pain	10 Electrocution	10 Oxygen - Cannula RATE: Min.	
11 Excessive Heat	11 Eye Pain	11 Hyperthermia	11 Oxygen - Mask RATE: Min.	
12 Falls	12 Fever/Hyperthermia	12 Hypothermia	12 Backboard	
13 Firearm Injury	13 Headache	13 Hypovolemia/Shock	13 Bleeding Controlled	
14 Lightning	14 Hypertension	14 Inhalation Injury (Toxic Gas)	14 Burn Care	
15 Machinery Accidents	15 Hypothermia	15 Obvious Death	15 CPR	
16 Mechanical Suffocation	16 Nausea	16 Poisoning/Drug Ingestion	16 ECG Monitoring	
17 MVC-Non-Public Road/Off Road	17 Paralysis	17 Pregnancy/OB Delivery	17 External Defibrillation/Cardioversion (Includes AED)	
18 MVC-Public Road	18 Palpitations	18 Respiratory Arrest	18 Immobilization - Extremity	
19 Pedestrian Traffic Accident	19 Preg./Childbirth/Miscarriage	19 Respiratory Distress	19 Immobilization - Spine	
20 Radiation Exposure	20 Seizures/Convulsions	20 Seizure	20 Immobilization - Traction Splint	
21 Smoke Inhalation	21 Syncope	21 Smoke Inhalation	21 Intravenous Catheter	
22 Sports Injury	22 Unresponsive/Unconscious	22 Stings/Venomous Bites	22 Intraosseous Catheter	
23 Stabbing	23 Vaginal Bleeding	23 Stroke/CVA	23 Intravenous Fluids	
24 Venomous Stings (plants, animals)	24 Vomiting	24 Syncope/Fainting	24 MAST/PASG	
25 Water Transport Accident	25 Weakness (malaise)	25 Traumatic Injury	25 Medication Administration	
O Other:	O Other:	26 Vaginal Hemorrhage	26 Obstetrical Care (Delivery)	
NA Not Applicable		O Other:	O Other:	
U Unknown		U Unknown	NA Not Applicable	

INJURY DESCRIPTION	Severe Bleeding	Blunt Injury	Laceration	Deformity	Partial Paralysis	Quadriplegia	Amputation	Crush	Burn
Head only									
Face									
Neck									
Thorax									
Abdomen									
Spine									
Hand, Arm									
Foot, Leg									
Body region unspecified									
N/A									

AIRWAY	SIZE	TIME	CERT #	ATTEMPTS	# UNSUC
1 Assist Vent (BVM)					
2 Assist Vent (Pos Press)					
3 Chest Decomp					
4 Cricothyrotomy					
5 EGTA/EOA/PTL					
6 ET					
7 Nasal Airway					
8 NG Tube					
9 Oral Airway					
10 Oxygen - Cannula					
11 Oxygen - Mask					
O Other:					

AGENCY USE _____

IV	FLUID TYPE	LOCATION	VOLUME	RATE	GAUGE	TIME	CERT #	ATTEMPTS	# UNSUC
1 Peripheral IV #1									
2 Peripheral IV #2									
3 External Jugular									
4 Internal Jugular									
5 Subclavian									
6 Intraosseous									
O Other:									

IV BOX: OLD# NEW#

OLD# NEW#

DRUG BOX: OLD# NEW#

DRUG	DOSE/ROUTE	TIME	CERT#	DOSE/ROUTE	TIME	CERT#
1 Albuterol						
2 Alupent						
3 Aspirin						
4 Atropine						
5 Bretylium						
6 Dextrose 50%						
7 EPI 1:1,000						
8 EPI 1:10,000						
9 Lidocaine						
10 Naloxone						
11 Nitro						

DRUG	DOSE/ROUTE	TIME	CERT#	DOSE/ROUTE	TIME	CERT#
12 Other:						
13 Other:						
14 Other:						
15 Other:						
16 Other:						
17 Other:						
18 Other:						
19 Other:						
20 Other:						
21 Other:						
22 Other:						

TIME CARDIAC ARREST WITNESSED	TIME 1ST CPR	PROVIDER OF 1ST CPR	TIME 1ST DEFIB	PROVIDER OF 1ST DEFIB	DEFIB DEVICE	TIME CPR D/C	TIME CIRCULATION RETURNED
		1 Bystander		1 Bystander	1 AED		
		2 Responder		2 Responder	2 Manual		
		NA N/Appl		NA N/Appl	NA N/Appl		
		U Unknown		U Unknown	U Unk		

END Mileage

START Mileage

TOTAL Mileage

TREATMENT AUTHORIZATION
1 Standing Orders
2 On-line
3 On-scene
4 Transfer Orders
5 DNR
NA Not Applicable
U Unknown

PHYSICIAN'S NOTES/ORDERS/SIGNATURE:

PHYSICIAN DEA#:

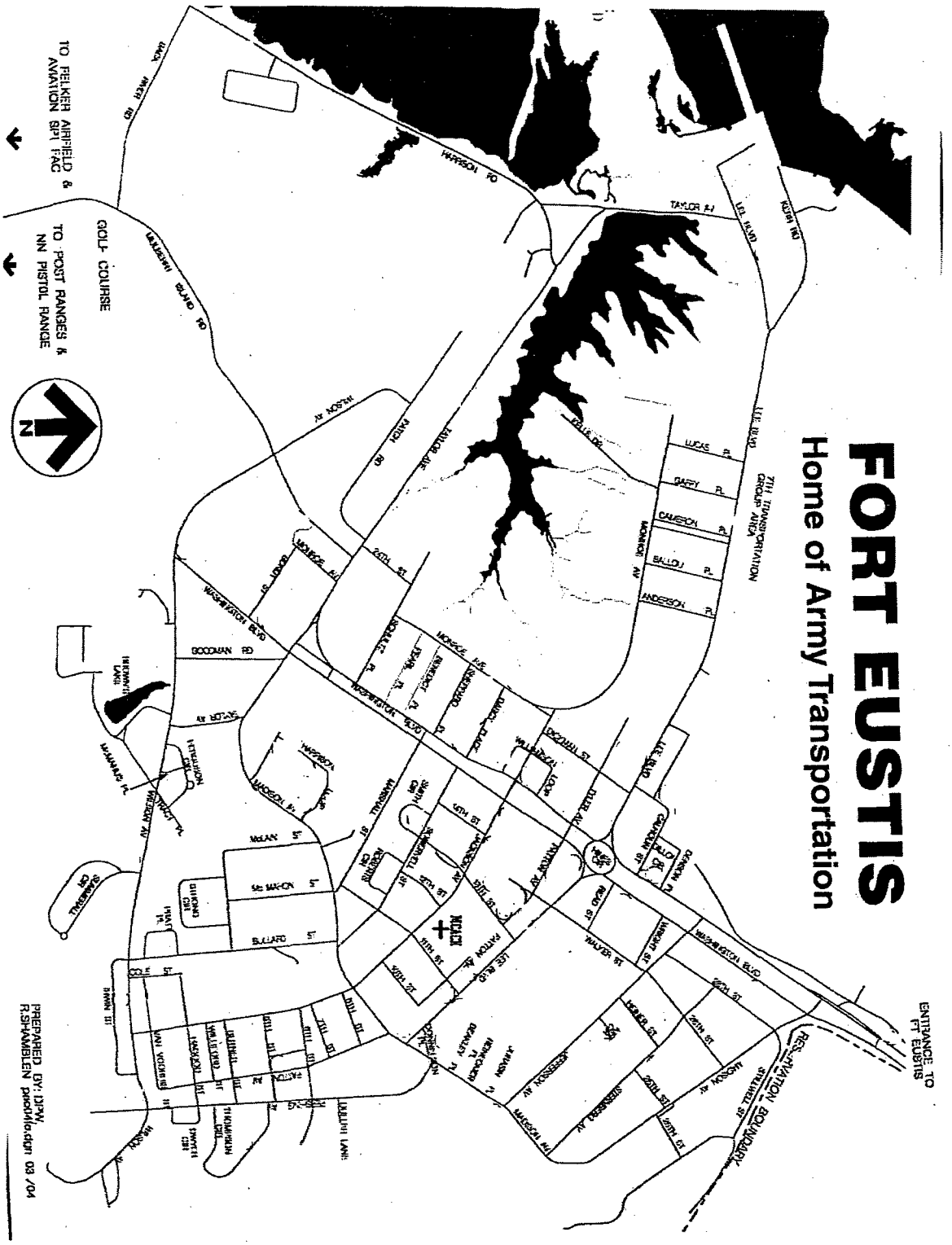
NARCOTICS ACCOUNTED FOR (SIGN):

MV IMPACT	SAFETY EQUIPMENT		LEVEL OF CARE PROVIDED	DESTINATION TRANSFERRED	DESTINATION DETERMINATION
1 Head-on	1 None Used	7 Helmet	1 BLS	1 Home	1 Closest Facility
2 Lateral	2 Shoulder Only	8 Eye Protection	2 ALS	2 Police/Jail	2 Patient/Family Choice
3 Ejection	3 Lap Only	9 Protective Clothing	NA Not Applicable	3 Medical Office/Clinic	3 Patient/Physician Choice
4 Rear	4 Shoulder/Lap	10 Pers. Float. Device		4 Other EMS Responder (Ground)	4 Managed Care
5 Rollover	5 Safety Seat	NA Not Applicable		5 Other EMS Responder (Air)	5 Law Enforcement Choice
6 Rotation	6 Air Bag	U Unknown		6 Hospital	6 Protocol
NA Not Appl				7 Morgue	7 Specialty Resource Center
U Unknown				NA Not Applicable	8 On-line Medical Direction
					9 Diversion
					O Other:
					NA Not Applicable

Receiving Facility:

____

Appendix C-Fort Eustis Map



Appendix D-Level IV Definiation

The level IV definition closely resembles MCACH capabilities

A level IV emergency department or service offers reasonable care in determining whether an emergency exists, renders lifesaving first aid, and makes appropriate referral to the nearest organizations that are capable of providing needed services, with at least one physician available immediately through two-way voice communication and in person within 30 minutes through a medical staff call roster. A Level IV emergency service may not necessarily operate 24 hours a day, and may not have a dedicated ambulance service supporting it. A Level IV facility may also operate as a walk-in acute care clinic. This definition is consistent with generally accepted standards of practice in DoD MTFs (DoD 6015.1-M does not include a definition of Level IV care) and the AMH [Accreditation Manual for Hospitals], and corresponds to the AIA [American Institute of Architect] definition for initial emergency management (Health Facilities) (DoD, 2004).

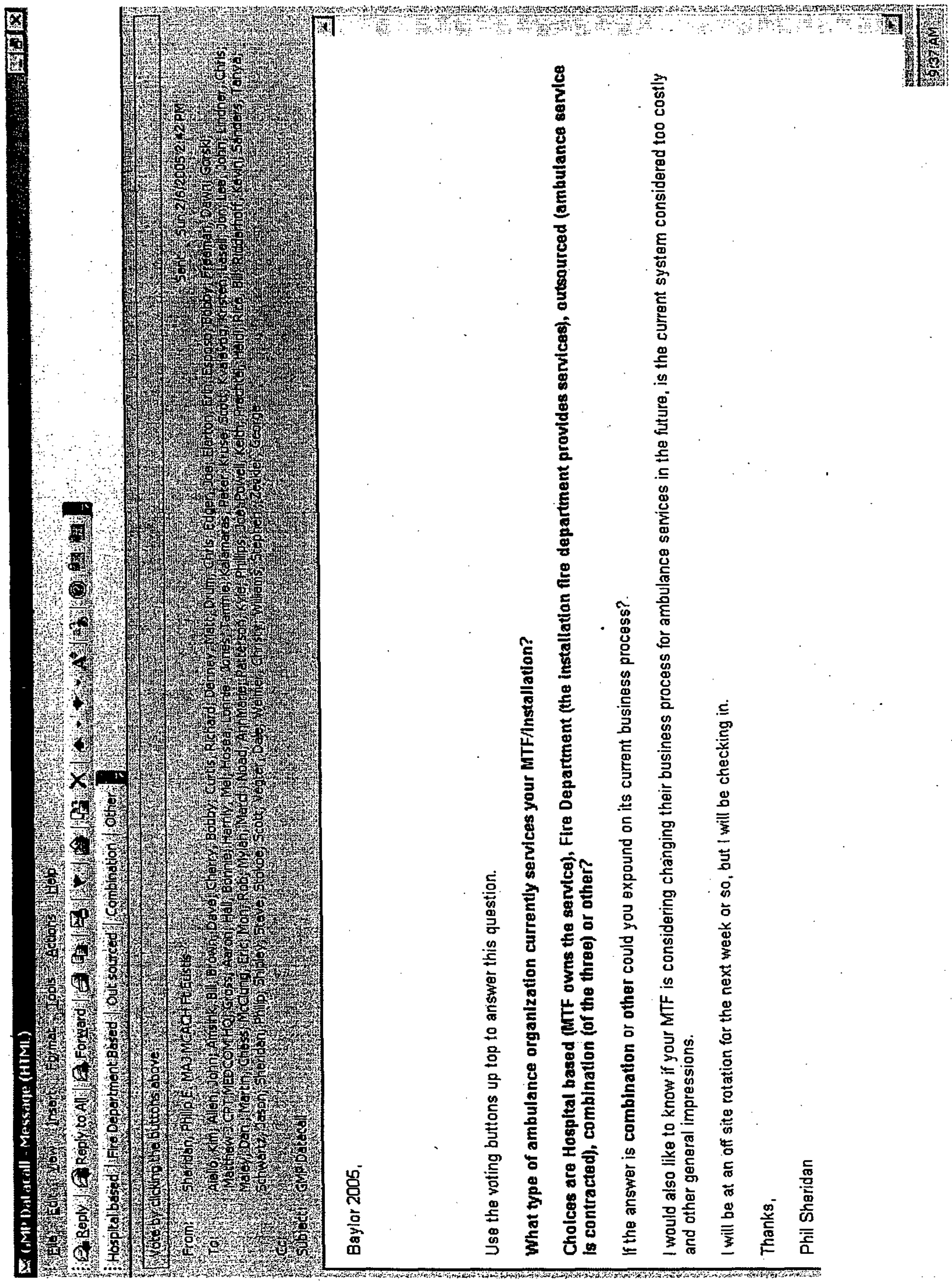
DoD Instruction (DIODI) 6055.6, DoD Fire and Emergency Services Program, provides further guidance on emergency medical services on military installations. The DODI stipulates that installations having a fire department performing the duties of the medical emergency responder are responsible for maintaining appropriate staffing and training and services that must be "provided in accordance with installation or local medical protocols" (DoD, 2000, p.11-12).

Appendix E-Acronyms

Acronyms

ALI	Automatic Location Information
ALS	Advanced Life Support
AMEDDC&S	Army Medical Department Center and School
ANI	Automatic Number Identification
ARC	American Red Cross
BLS	Basic Life Support
CBRNE	Chemical Biological Radiological Nuclear and High Explosive
CHCS	Composite Health Care System
CPT	Common Procedural Terminology
DERA	Designated Emergency Response Agencies
DLS	Dispatch Life Support
EMT	Emergency Medical Technician
FCC	Functional Cost Center
FEFD	Fort Eustis Fire Department
FIPS	Federal Information Processing Standards
HEAR	Hospital Emergency Administrative Radio
M2	MHS Management and Analysis Tool
MCACH	McDonald Army Community Hospital
MHS	Military Health System
MI	Mary Immaculate
NARMC	North Atlantic Regional Medical Command
NMC-P	Naval Medical Center-Portsmouth
NNFD	Newport News Fire Department
OEMS	Office of Emergency Medical Services
OHI	Other Health Insurance
PA&E	Program Analysis and Evaluation Division
PPCR	Prehospital Patient Care Reports
PSAP	Public Safety Answering Point
PUM	Public Utility Model
TRADOC	Training and Doctrine
UCC	Urgent Care Center
VAMC	Veteran Affairs Medical Center

Appendix F- Sample Email Survey



GMP Datacall - Message (HTML)

File Edit View Insert Format Tools Actions Help

Reply | Reply to All | Forward

Hospital based | Fire Department Based | Out sourced | Combination | Other

Vote by clicking the buttons above.

From: Sheridan, Philip E. MAJ MCACH Ft Eustis Sent: Sun 2/6/2005 2:42 PM

To: Aiello, Kim; Allen, John; Amsink, Bill; Brown, Dave; Cherry, Bobby; Curtis, Richard; Denney, Matt; Drum, Chris; Edgen, Joe; Elarton, Erin; Esposo, Bobby; Freeman, Dawn; Gorski, Matthew J CPT MEDCOM HQ; Gross, Aaron; Hall, Bonnie; Hamly, Mel; Hosea, Lonnie; Jones, Tammie; Kalamaras, Peter; Kruse, Scott; Kvalevog, Kristen; Lasell, Jon; Lee, John; Lindner, Chris; Maley, Dan; Martin, Chess; McClung, Eric; Mon, Rob; Mylan, Merci; Noad, AnnMarie; Patterson, Kyle; Phillips, Joe; Powell, Keith; Prechtel, Heidi; Rice, Bill; Ridderhoff, Kevin; Sanders, Tanya; Schwartz, Jason; Sheridan, Philip; Shipley, Steve; Stokoe, Scott; Vegter, Dale; Weimer, Christy; Williams, Stephen; Zeckler, George

Cc:

Subject: GMP Datacall

Baylor 2005,

Use the voting buttons up top to answer this question.

What type of ambulance organization currently services your MTF/Installation?

Choices are Hospital based (MTF owns the service), Fire Department (the installation fire department provides services), outsourced (ambulance service is contracted), combination (of the three) or other?

If the answer is **combination** or **other** could you expound on its current business process?

I would also like to know if your MTF is considering changing their business process for ambulance services in the future, is the current system considered too costly and other general impressions.

I will be at an off site rotation for the next week or so, but I will be checking in.

Thanks,

Phil Sheridan

9:37 AM

Appendix G -15 Components of an EMS System

Emergency Medical Services Systems (EMSS) Act of 1973 (Public Law 93-154)

15 Components of an EMS System

1. Manpower
2. Training of Personnel
3. Transportation
4. Facilities
5. Critical Care Units
6. Transfer of Patients
7. Standard Medical Record Keeping
8. Independent Review and Evaluation
9. Consumer Information & Education
10. Accessibility of Care
11. Communications
12. Use of Public Safety Agencies
13. Consumer Participation
14. Mutual Aid Agreements
15. Disaster Linkage

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